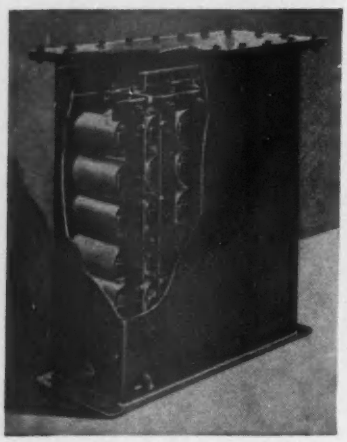
Don't just say cables – say AEI

Four Contacts per Turn.

The foil in these Bryce capacitors is extended beyond the edge of the impregnated paper dielectric to right and left alternately, and the unique spring-loaded end-contacts provide four conducting paths on each turn of foil, giving better electrical and thermal conduction, and an almost completely non-inductive winding.

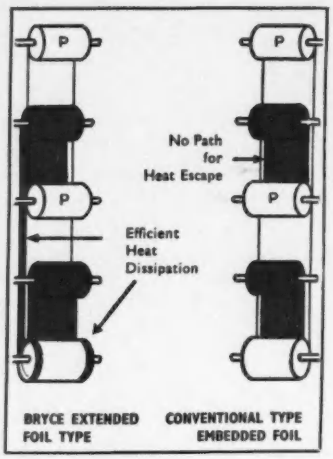
The importance of minimal heat production and improved dissipation requires no emphasis, since it is within the experience of all Electrical Engineers that heat is probably the commonest cause of capacitor breakdown. The Bryce Extended Foil capacitor element holds down temperature rise because there is improved heat transfer from dielectric to case side-walls and less heat generated due to resistance losses.



No Processed Joints.

The spring-loaded pressure contacts at each end of the capacitor element supersede the conventional method of inserting a connection strip in the capacitor element during winding.

With this arrangement the strip only makes contact over a small area of foil, and the length of the current path is great, with consequent resistive and inductive losses. Also this method is known to tend to give rise to internal discharges. The method of using a soldered connection from the foils, while overcoming these disadvantages, introduces the risk of damaging the paper dielectric by overheating.



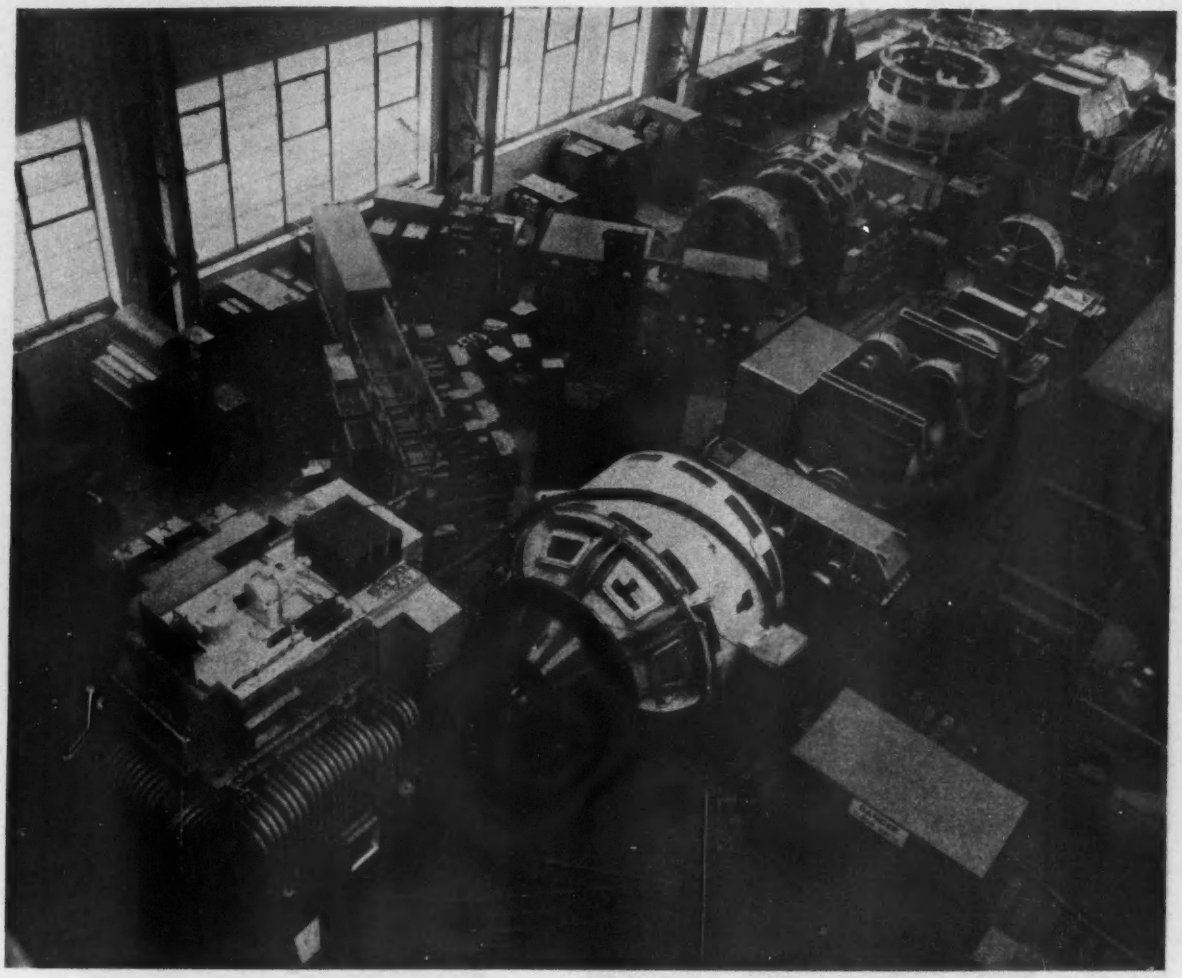
Short Current Path.

The current path is the most direct conceivable and the multiplicity of contact points provides insurance against faulty connection, even under the most severe surge conditions. Improved efficiency of the conducting path minimizes current densities and consequently keeps to a minimum the temperature rise due to this cause.

Better Heat Dissipation.

With projecting foils there is a high conduction path for heat from the centre of the element to the oil or Aroclor which is used as a coolant. The heat conductivity is much better than that with embedded foils where heat has to be conducted through paper which is a very poor heat conductor. The lower temperature gradient in Bryce Capacitors improves their expectation of life.

BRYCE **BRYCE ELECTRIC CONSTRUCTION CO. LTD.**
Kelvin Works, Hackbridge, Surrey Telephone: Franklin 1101-7
Broadway/bec 7



A section of the L.S.E. Heavy Machine Test Bed. In the foreground, a 2400/1050 h.p., 450/345 r.p.m. N-S variable-speed a.c. motor (one of four for Uskmouth Power Station, driving Gwynnes pumps). The control scheme incorporates L.S.E. 'Asmag' automatic control gear.

BETTER (and often BIGGER)

Within the last decade or two the average electric motor has been raised in status. Now, in partnership with appropriate control gear, it is often required to form part of complex systems of control of quality and quantity.

At the same time, the rating of electric motors for the larger industrial drives has shown a marked increase, outputs of upwards of 1,000 h.p. now being commonplace.

L.S.E. have progressed and developed on both fronts, and are well qualified to provide electric power equipments capable of integration into the overall control scheme of the most advanced types of machines or production systems, involving outputs of from one to several thousand horse-power.

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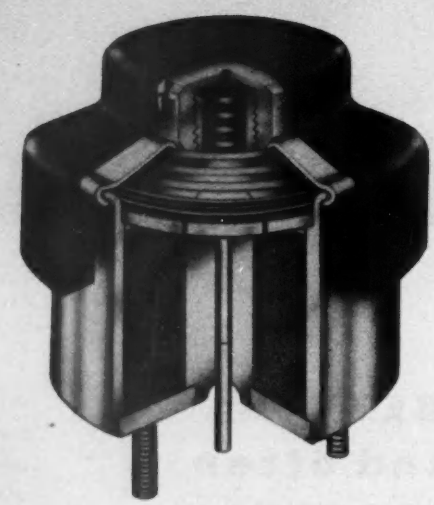

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There's a 20p. technical brochure we invite you to study.

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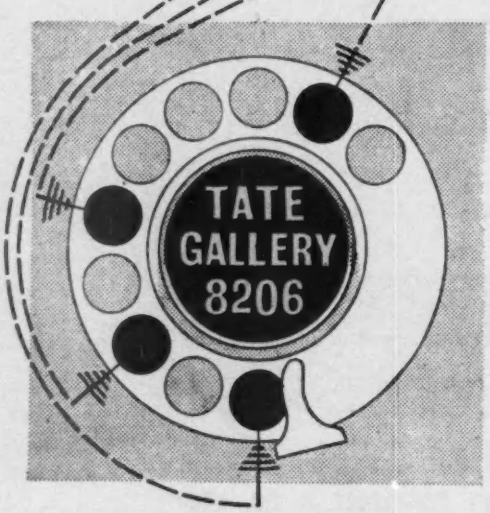

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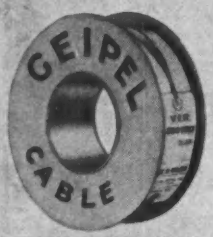
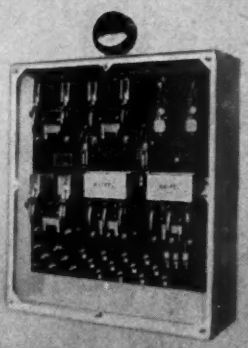


TO BRITISH STANDARD SPECIFICATIONS



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NEWS for light van users!

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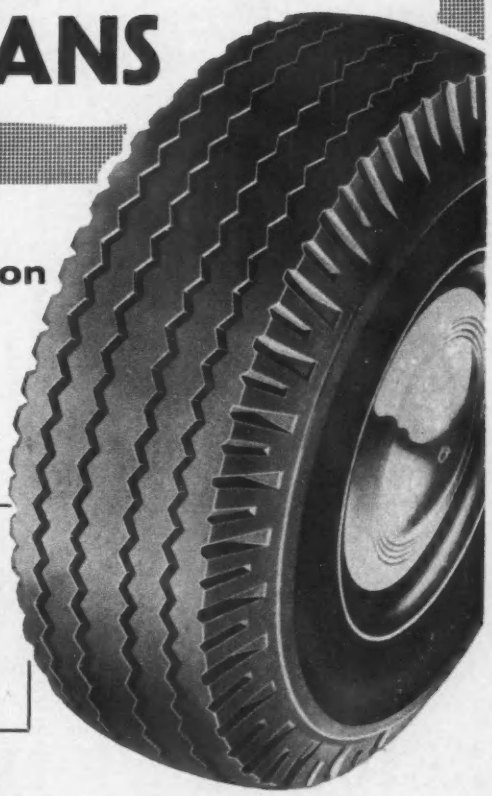
now available to reduce tyre costs on LIGHT VANS

Commercial truck tyre construction with deeper non skid pattern. Greater volume of tread rubber and stronger beads.



The famous Firestone TRANSPORT TYRE is available in the following light van sizes

6.00-16	6.40-15	6.70-13	7.00-15	7.50-16	9.00-16
6.40-13	6.50-16	6.70-15	7.00-16	8.25-16	

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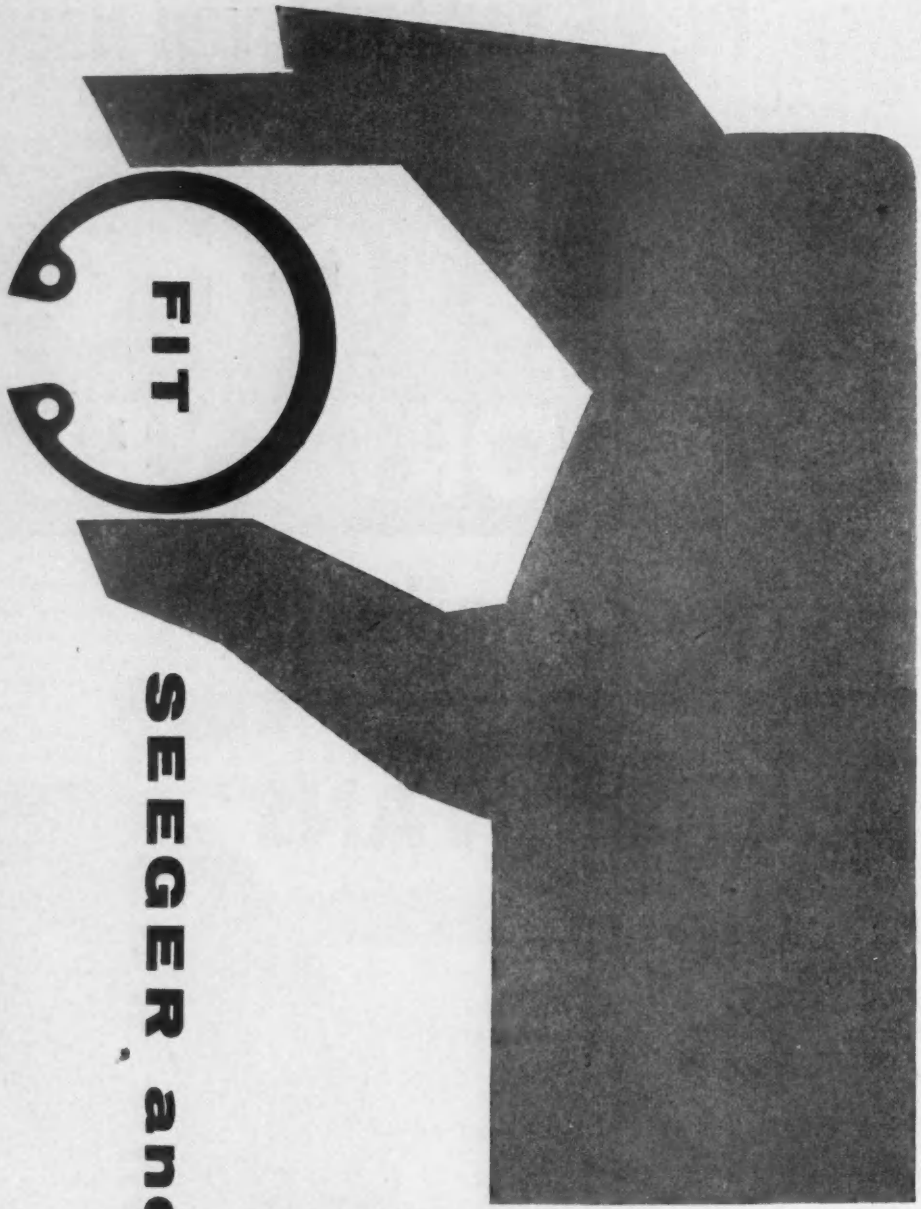
Lower your operating costs by using HEAVY TRUCK TYRES on your vans



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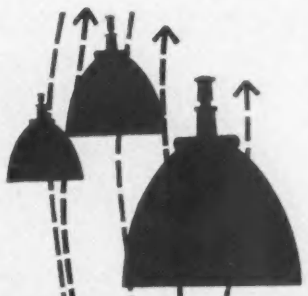

new self-cleaning high bay lighting

The new Simplex Airflo fitting gives you increased efficiency plus greater adaptability. It is pleasantly contoured; weighs only 10 lbs complete with Simplex Discon* device fitted for extra ease of installation and maintenance.

The Airflo's aluminium reflector is cleaned by a unique high velocity dust expulsion ensuring efficient lighting—a priority consideration in modern industry. Available in two sizes for use with 250W-1000W MBF U lamps. Send for leaflet for details.

Airflo for Fords! In the Machine and Tool shop at Dagenham, fittings were mounted at a spacing height ratio of 1:1 giving an illumination value of 25.5 lumens per sq. ft.

CALCULATED REFLECTION THROWS A GREAT DEAL OF LIGHT ON INDUSTRY

'AirFlo'

*The Simplex Discon device allows instant connection to or disconnection from the conduit system without disturbing wiring or lampholder. Leaflet L.2192 gives full details.

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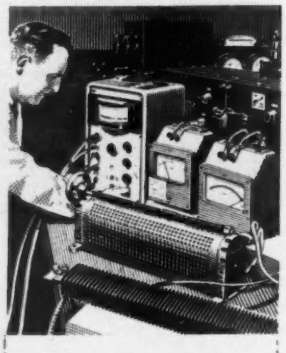

In the constant search for better materials giving higher standards of electrical safety, this Megohmmeter is playing its part — measuring the insulation resistance of a heating element made with a new refractory insulation.

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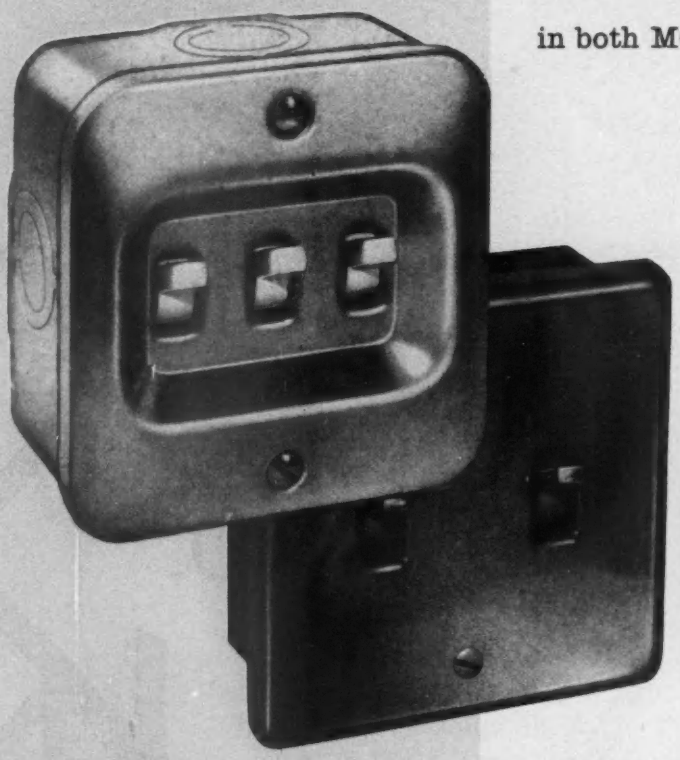
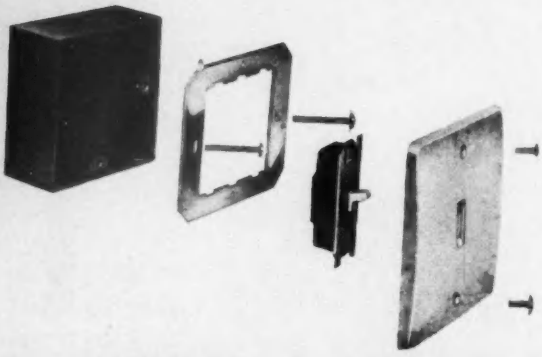
switch assemblies

in both MOULDED and METAL patterns



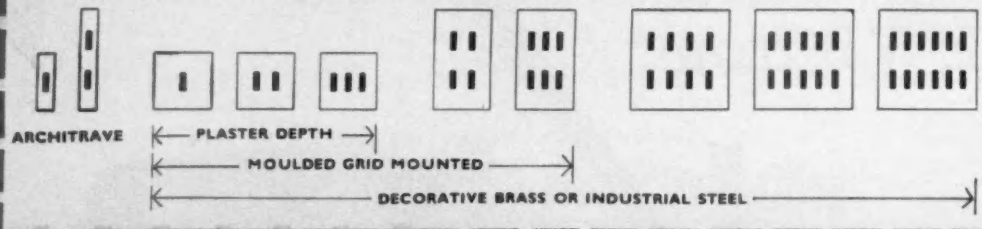
Moulded and metal patterns to choice—and now, with no less than 44 different switch plates available, you can specify 'Mutac Clipper' switch assemblies for every installation.

'Mutac Clipper' switch assemblies are precision made, silent of course, and they bring you the proven advantage of simplest ever installation, with obvious savings in time and money. A handy switch selector is available, free on request, to simplify ordering.



44 DIFFERENT SWITCH PLATES BASED ON 26 ASSEMBLIES

MOULDED, BROWN or OFF-WHITE—BRASS, SATIN CHROME or B.M.A.—STEEL, ALUMINIUM STOVE ENAMEL



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5 amp 1 way S.P.
15 amp 1 way S.P.
5 amp 1 way D.P.
5 amp 2 way S.P.
5 amp 2 way & Off
5 amp intermediate
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Complete safety is assured by

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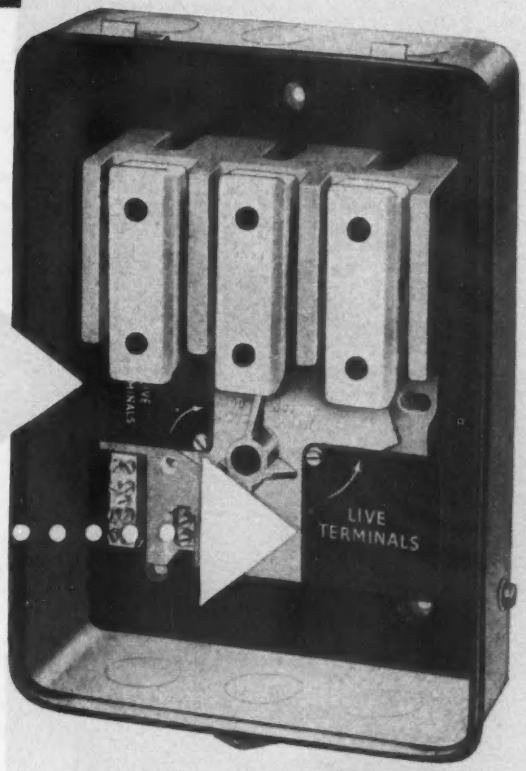

other HIDUTAC advanced features

High Fault Current Protection with H.R.C. or rewireable fuses. Categories of duty are: H.R.C. fuses (all ratings) AC 4 of BS 88 (33000 amps.) Rewireable fuses 15 & 30 amp. ratings. S2A of BS 3036 (2000 amps.) Rewireable fuses 60 amp. rating. S4A of BS 3036 (4000 amps.)

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15, 30 or 60 amp. 440 volt a.c. Single Pole and Neutral, Double Pole, Triple Pole, Triple Pole and Neutral Switchfuses with either H.R.C. or rewireable fuses.

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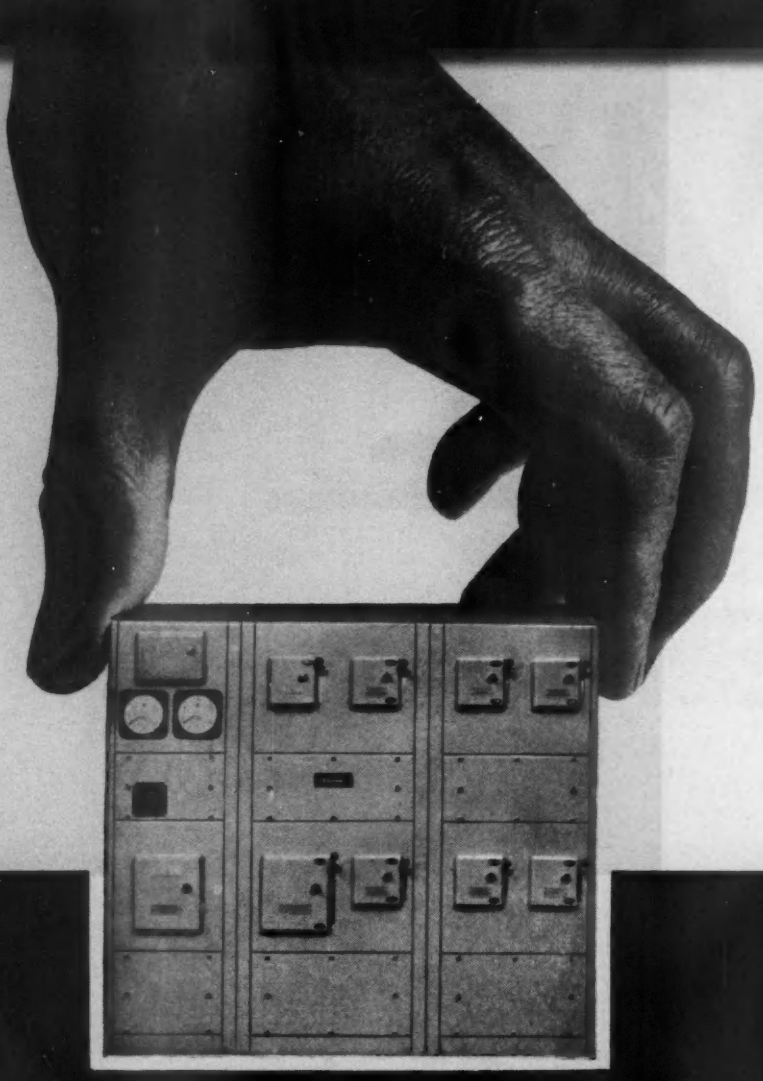
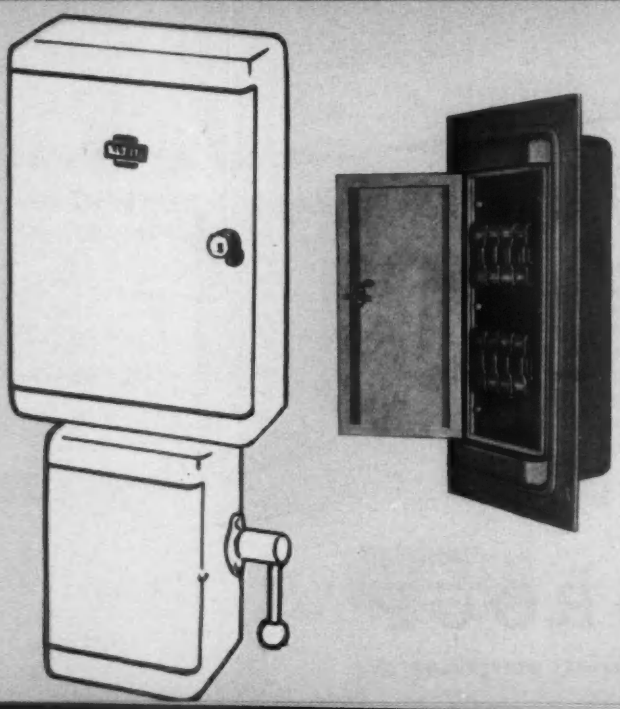


CUBICLE TYPE
SWITCHGEAR

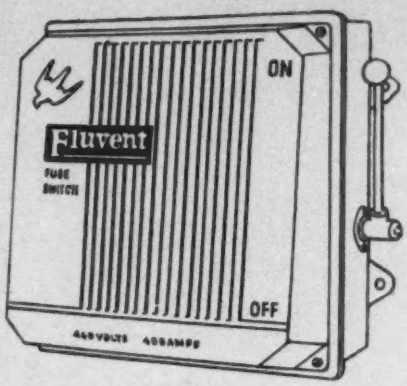
Compactness is a noteable feature of FLUVENT cubicle type switchgear. It has been achieved without prejudice to safe and adequate clearances between phases, and phases to neutral throughout the bus-bar system, and in the interconnections between bus-bars and circuits. Due consideration has also been given to the requirements of cable space and phase barriers, and safety guards are provided throughout to comply fully with the appropriate statutes and official regulations. The superiority of this switchgear is further assured by our AEROFLEX rewireable High Breaking Capacity Fuse-Links which have been tested well beyond BS requirements.

Fluvent *Switch & Fuse Gear*



CABINET TYPE
DISTRIBUTION BOARDS

Remarkable performance is achieved in compact, modern design — both being major contributions to the undoubted superiority of FLUVENT cabinet style distribution boards. Construction is of steel with grey, corrosion-proof hammer finish. Control switches to match can be mounted with the boards *(left hand illustration)*. Recessed models *(right hand illustration)* are designed to fit into a wall cavity. All boards are fitted with AEROFLEX High Breaking Capacity rewireable cartridge Fuse-Links.
Write for List DBC2



FALCON
HEAVY DUTY
FUSE SWITCHES

Performance beyond the requirements of BS. 3185-1959 ensures that FLUVENT Falcon heavy duty fuse-switches are always well in control, however arduous the duties. FLUVENT Falcon are made in 60, 100, 150, 300 and 400 amp sizes, each with full certification. All are fitted with AEROFLEX Fuses, with their outstanding time-lag and non-ageing characteristics.
Making capacity: 46 K.A. Fuse breaking capacity: 46 K.A. Switch breaking capacity: 5 to 7 times rated current at 0.3 power factor.

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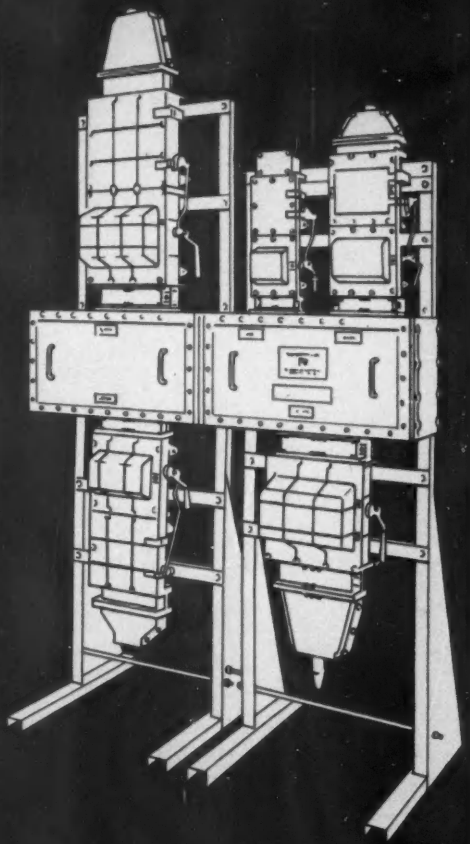

FLAME PROOF
SWITCH & FUSE GEAR

Superior design and the best materials combine with meticulous workmanship in FLUVENT switch and fuse gear, made up to 150 amp size. All are covered by the appropriate Ministry of Power certificates and all are fitted with AEROFLEX rewireable High Breaking Capacity Fuse-Links. Write for List FP1.

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GENERATORS ½-150 K.W., INVERTED ROTARY CONVERTERS
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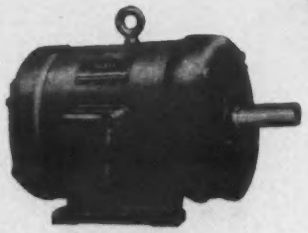
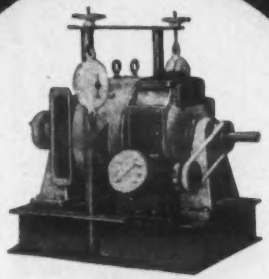
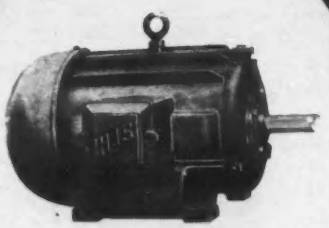


A.C. DRIP PROOF MACHINE

A.C. VERTICAL FLANGE TYPE



DYNAMOMETER FOR COLLEGE USE



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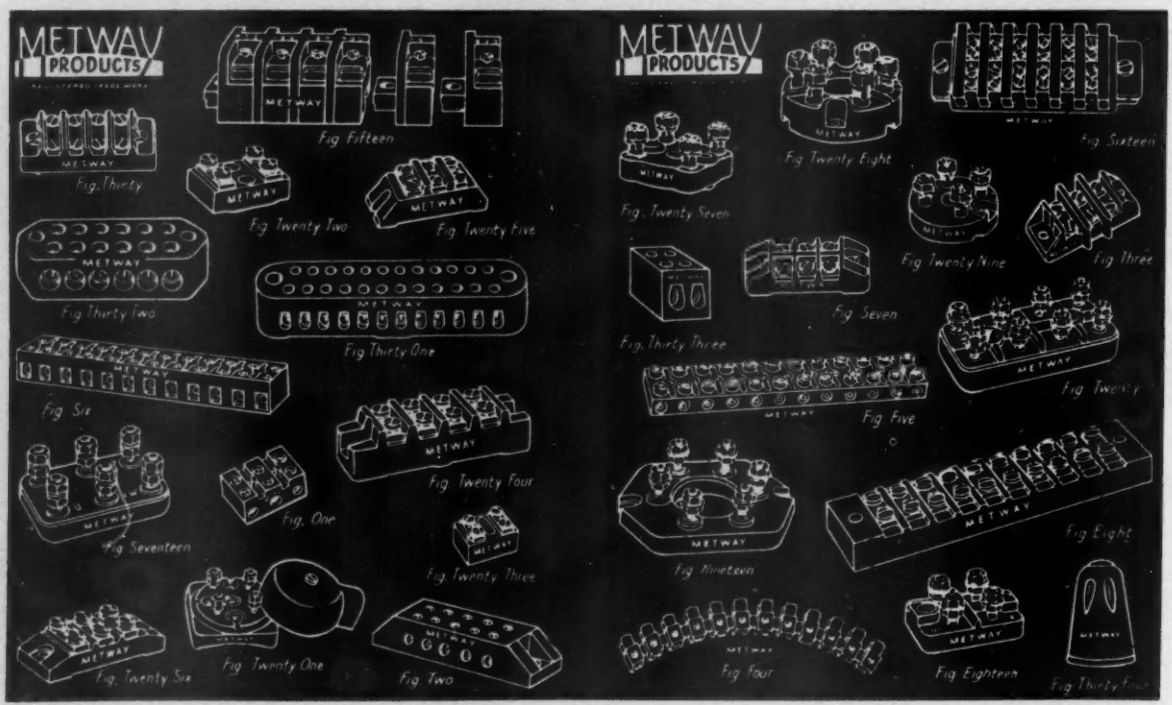
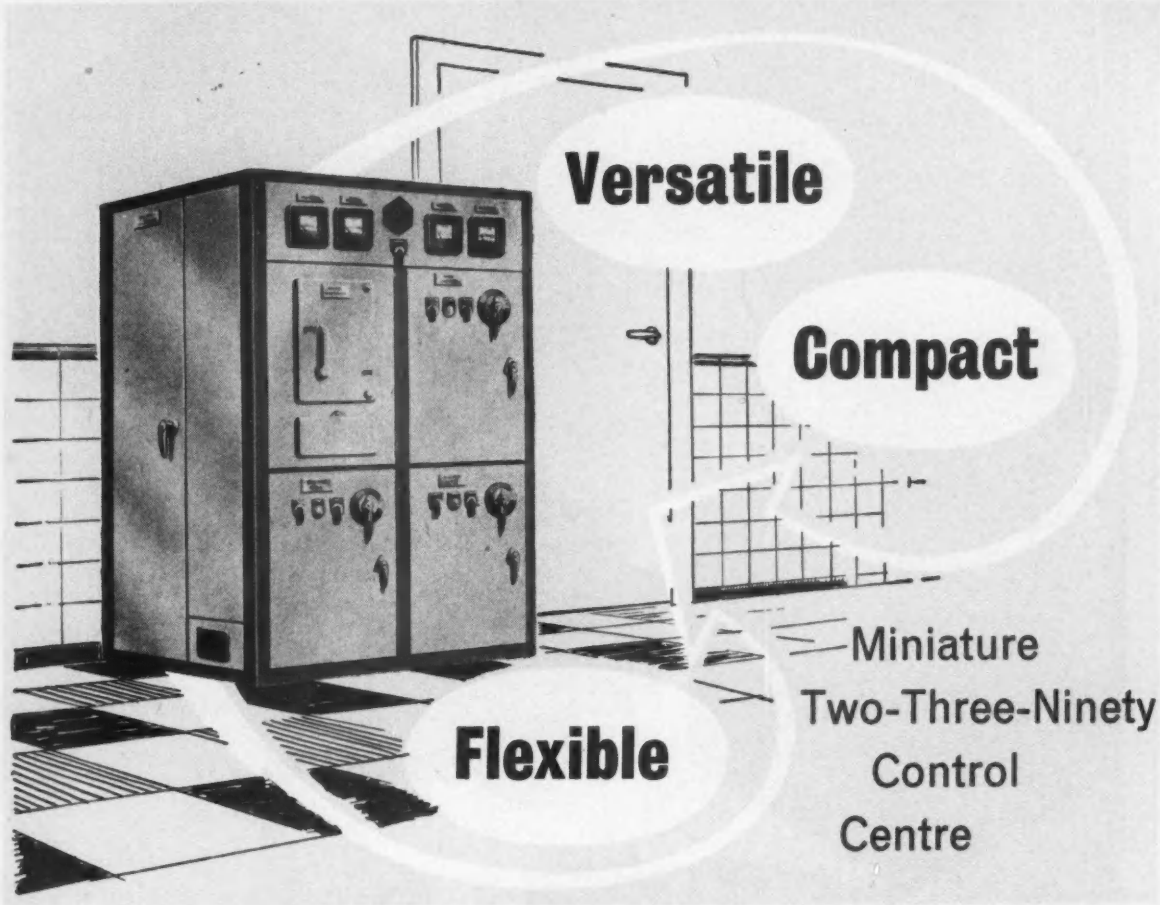
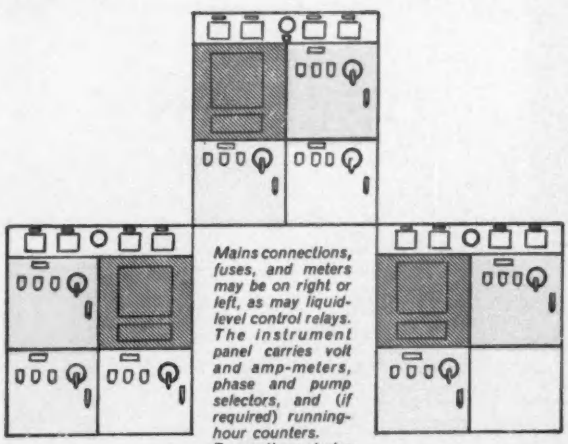
TERMINAL BLOCKS BY METWAY



BLOCK CONNECTORS. 5-100 AMP. 1-12 WAY, IN BAKELITE, PVC, RUBBER, NYLON AND PORCELAIN

★FOR FULL DETAILS WRITE FOR CAT. No. NBQ/12ET. **METWAY • KEMP TOWN • BRIGHTON**





Mains connections, fuses, and meters may be on right or left, as may liquid-level control relays. The instrument panel carries volt and amp-meters, phase and pump selectors, and (if required) running-hour counters. Two or three starter panels and one main isolator panel in any layout to choice.

Designed to consultant's specifications, the new Brookhirst Igranic Miniature Two-Three-Ninety control centre is ideal for small drainage, water or sewage pumping stations, or for extensions to larger works.

VERSATILE . . .

controlling two or three pumps to an aggregate of 90 h.p.

COMPACT . . .

Height only 4′ 6″, width 3′ 3″, depth from wall 2′.

FLEXIBLE . . .

Front and side access, accommodation for three starters in any arrangement.

Please write to us at Bedford Works, Bedford, for full particulars.

BHI

Metal Industries Group

BROOKHIRST IGRANIC

Sales Headquarters and Cost Sales Division: **Bedford Works · Bedford**

Works at: **Bedford and Chester**

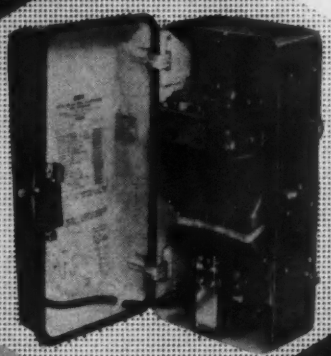
Area Offices: Birmingham Bournemouth Bristol Cardiff East Anglia Glasgow Leeds London Manchester Newcastle Nottingham Sheffield Belfast

Makers of Britain's widest range of electrical control and associated equipment

BI/16

a complete range* of standard motors and starters

* Including British Standard ventilated 'C' frame (to B.S.2960) and totally enclosed 'B' (to B.S. 2083) and 'D' frame (to B.S.2960 pt.II) motors. Matching direct-to-line (non-reversing and reversing) and star-delta starters.



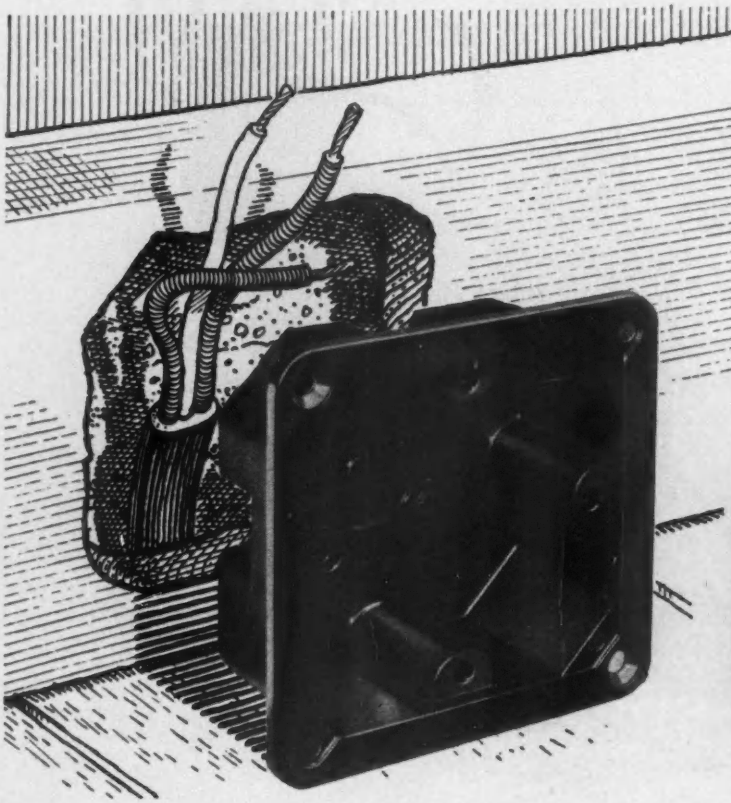
DELIVERY FROM STOCK

RELY ON THE EXPERIENCE OF

G.E.C.

The General Electric Co. Ltd. of England
Rotating Plant Division Birmingham 6

MK200



NEW—FROM MK

Moulded Flanged Box

Simplifies the recessing of flush accessories into skirtings.

Only requires a roughly cut hole (as illustrated above) to be cut in skirting.

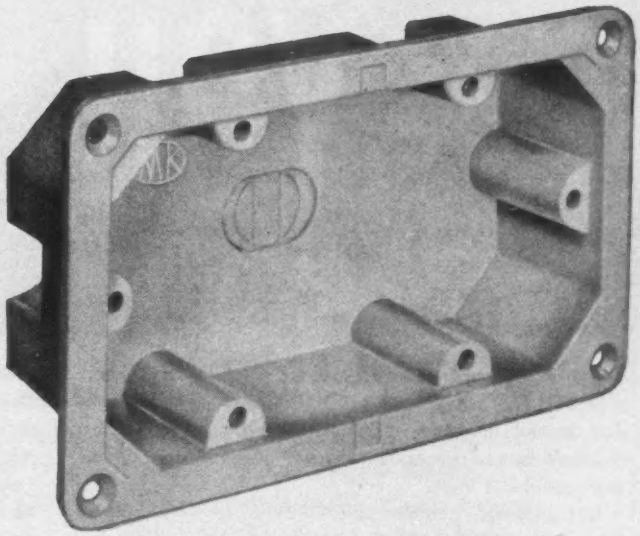
Flanged box is inserted and secured to the skirting from the front flange by corner screws.

Flush accessory is fixed into the flanged box by the usual 4BA screws.

List No. 2061—One gang—for any MK accessory having $2\frac{3}{8}$" fixing centres.

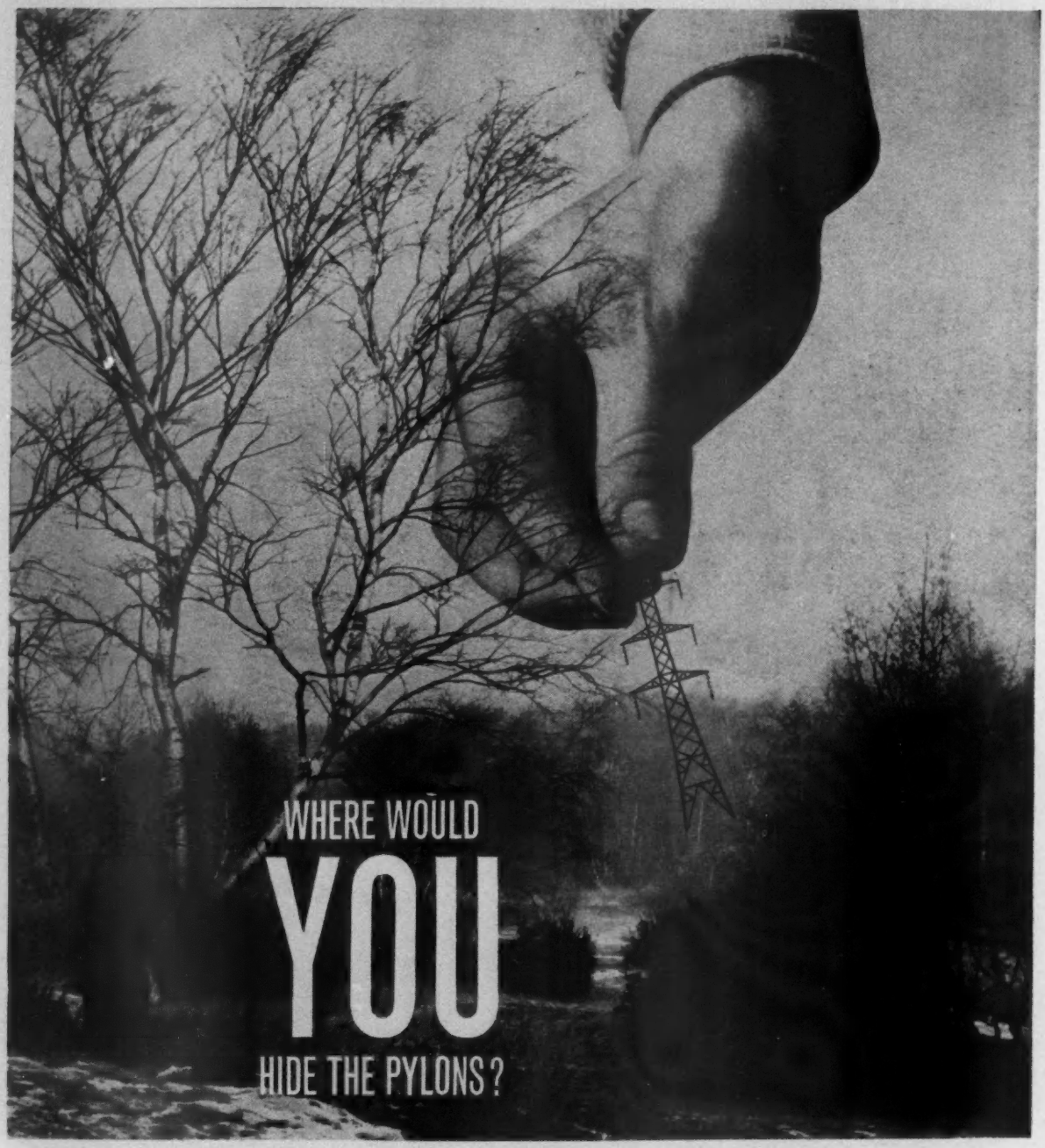
List No. 2062—Two gang—for any MK two gang accessory.

Available in Brown or Ivory.



Please ask for Leaflet 257

M. K. ELECTRIC LIMITED · SHRUBBERY ROAD · EDMONTON · LONDON · N.9 EDMONTON 5151



Not even trees can hide the pylons completely . . . but pylons there must be if people want the amenities that depend on electrical power. Over the next ten years Britain's power demands will double—and that means more overhead lines.

But although pylons can't be made invisible, power lines can be planned to follow the least conspicuous route, to take advantage of natural screens such as woods and hills, and only break cover when unavoidable. This kind of careful planning, which is going on all over the country today, is in the hands of the Central Electricity Generating Board, which is charged by Act of Parliament to provide an efficient and economical power supply to the nation, while doing everything possible to preserve the natural beauties of the countryside.

■ These advertisements are appearing in the farming and country magazines. The Central Electricity Generating Board thank electrical contractors for their co-operation in the past, and know that they will do all they can to preserve the amenities of the countryside.

THE CENTRAL ELECTRICITY GENERATING BOARD CEGB

NEWS SHEET

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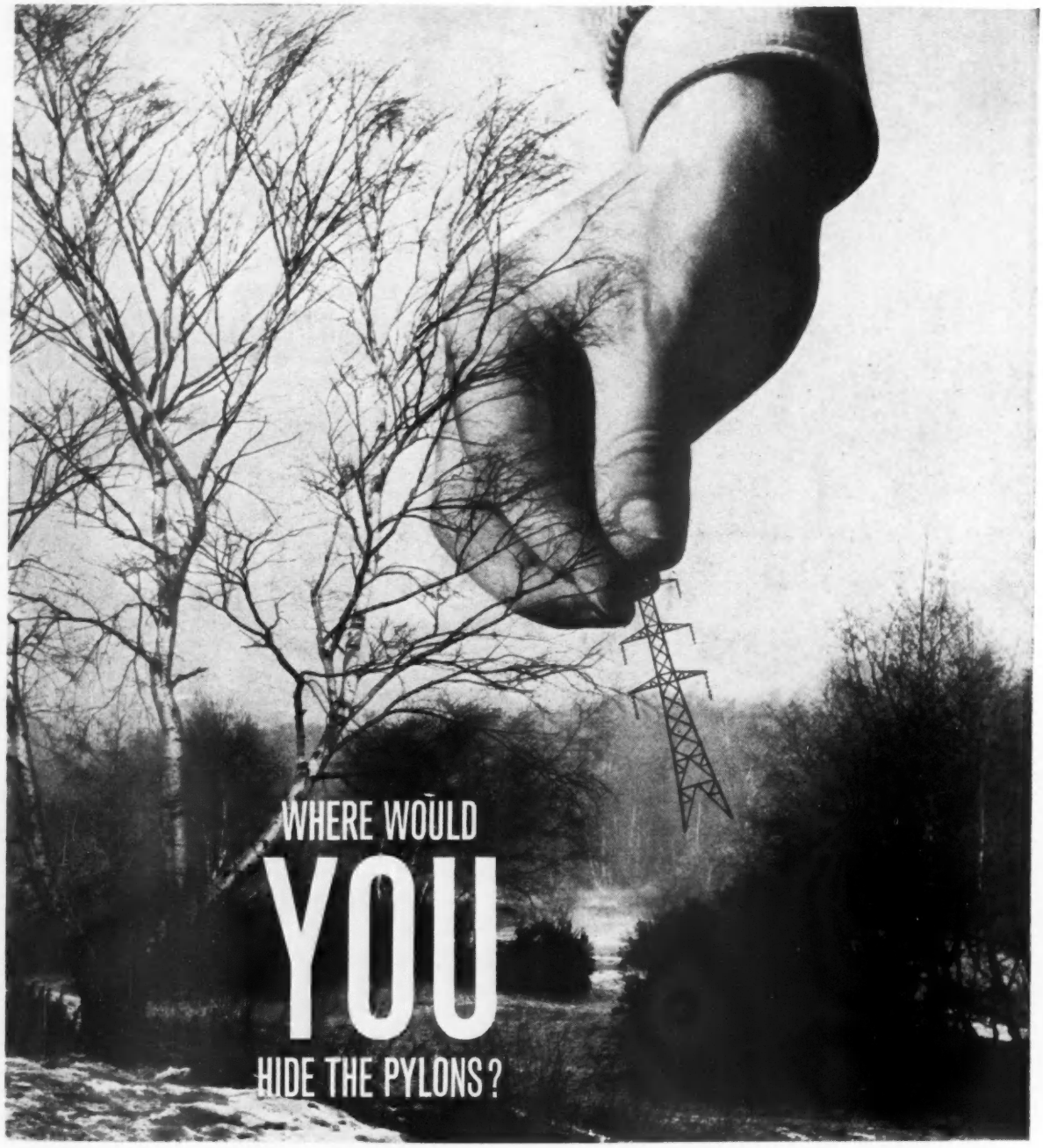

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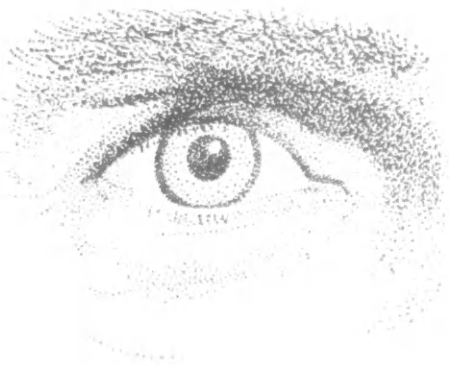

'Ashley' have an eye for design!

A.S.E.E. ELECTRICAL ENGINEERS EXHIBITION
EARLS COURT MARCH 21st-25th
VISIT US ON STAND F5 GROUND FLOOR

A combination of creative and functional design is evident in Ashley 13 amp Sockets and Switchsockets.

Particular emphasis is placed on users' safety e.g. the Ashley 13 amp Switchsocket has a "safety switch" (second switch in series with dolly switch) automatically preventing plug pins from becoming alive until almost home.

Accepted by The Council of Industrial Design for "Design Index".

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General Design: All products to relevant British Standard. Smooth contour styling in Brown or Cream; Heavy Duty in Black.

Twin Socket & 'Pattrebox'

Surface: Integral with 'Pattrebox' widely adaptable to suit a variety of new and conversion installation requirements in PVC, TRS and M.I.C.C. Cable. Apply for fully descriptive pamphlet.

Flush: Plaster depth or deep box applications, centralised common L N & E terminals.

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Installation

All products of the range possess generous and effective Knockouts, Terminals, Wiring Space and Fixings compatible with modern requirements.

SOCKET			SAFETY SWITCHSOCKET			TWIN SOCKET & 'PATTREBOX'		
Cat. No.	TYPE	Doz. List	Cat. No	TYPE	Doz. List	Cat. No.	TYPE	Doz. List
SK 31	Surface Br.	44/-	SS 31	Surface Br.	69/-	SK 231	Surface with 'Pattrebox' Br	92/-
SK 32	Surface Cr.	50/-	SS 32	Surface Cr.	76/-	SK 232	Surface with 'Pattrebox' Cr	104/-
SK 35	Flush Br.	42/-	SS 35	Flush Br.	67/-	SK 235	Flush Br.	88/-
SK 36	Flush Cr.	48/-	SS 36	Flush Cr.	74/-	SK 236	Flush Cr.	98/-
HEAVY DUTY						HEAVY DUTY		
SK 41	Surface Blk.	65/8	SS 41	Surface Blk.	92/8	SS 241	Surface with 'Pattrebox' Blk.	130/-
SK 45	Flush Blk.	54/4	SS 45	Flush Blk.	81/4	SS 245	Flush Blk.	110/-

Br. — Brown Cr. — Cream Blk. — Black

Ashley

ASHLEY ACCESSORIES LIMITED, Ulverston, Lancashire, Eng. Telephone: Ulverston 3333. Telegrams: Ashley, Ulverston

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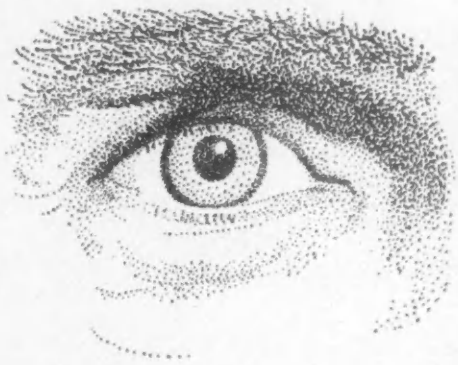

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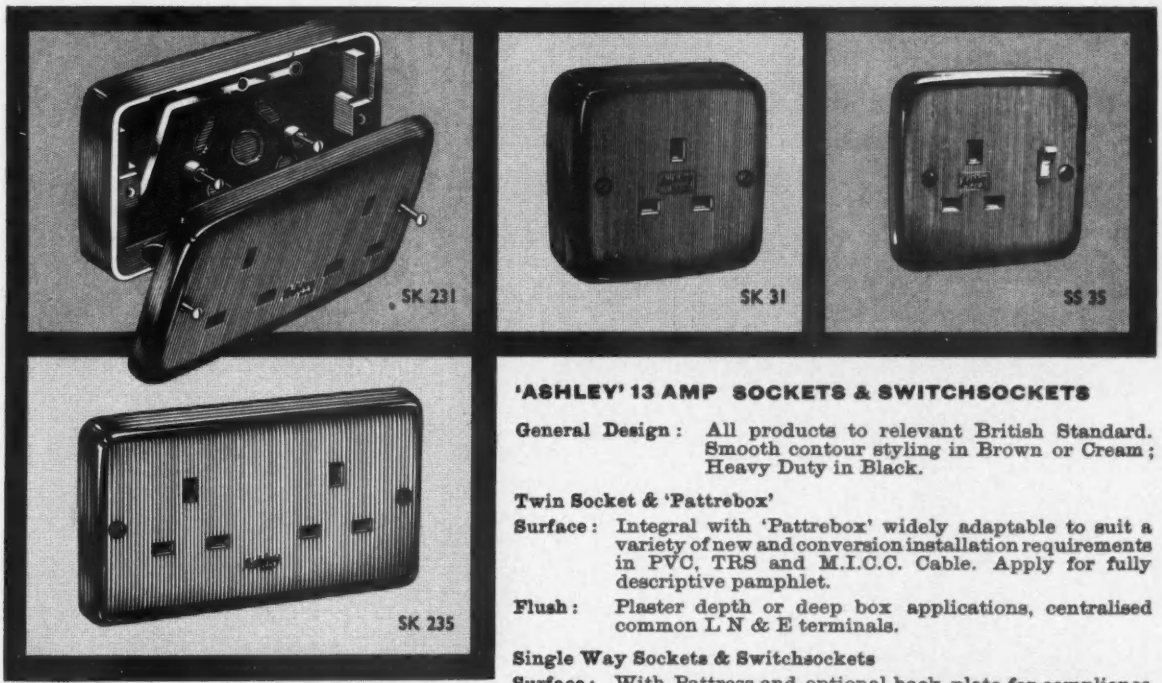

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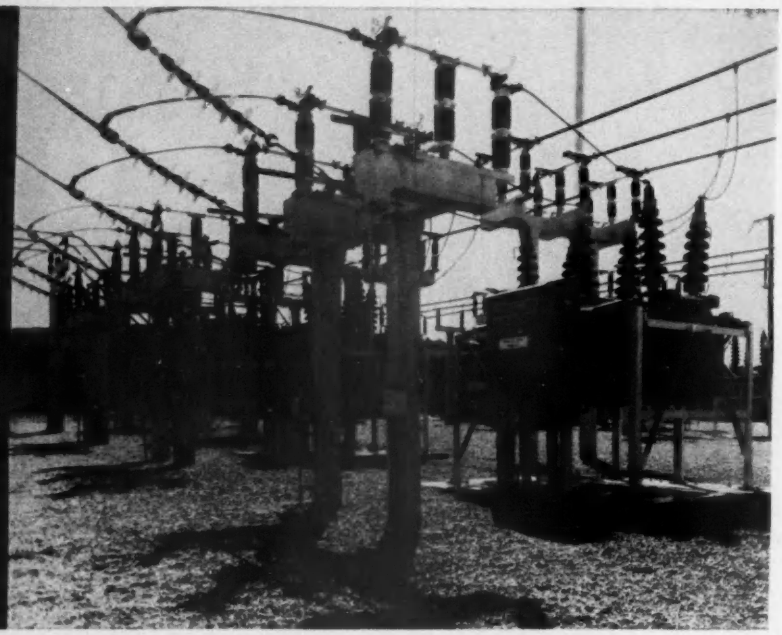
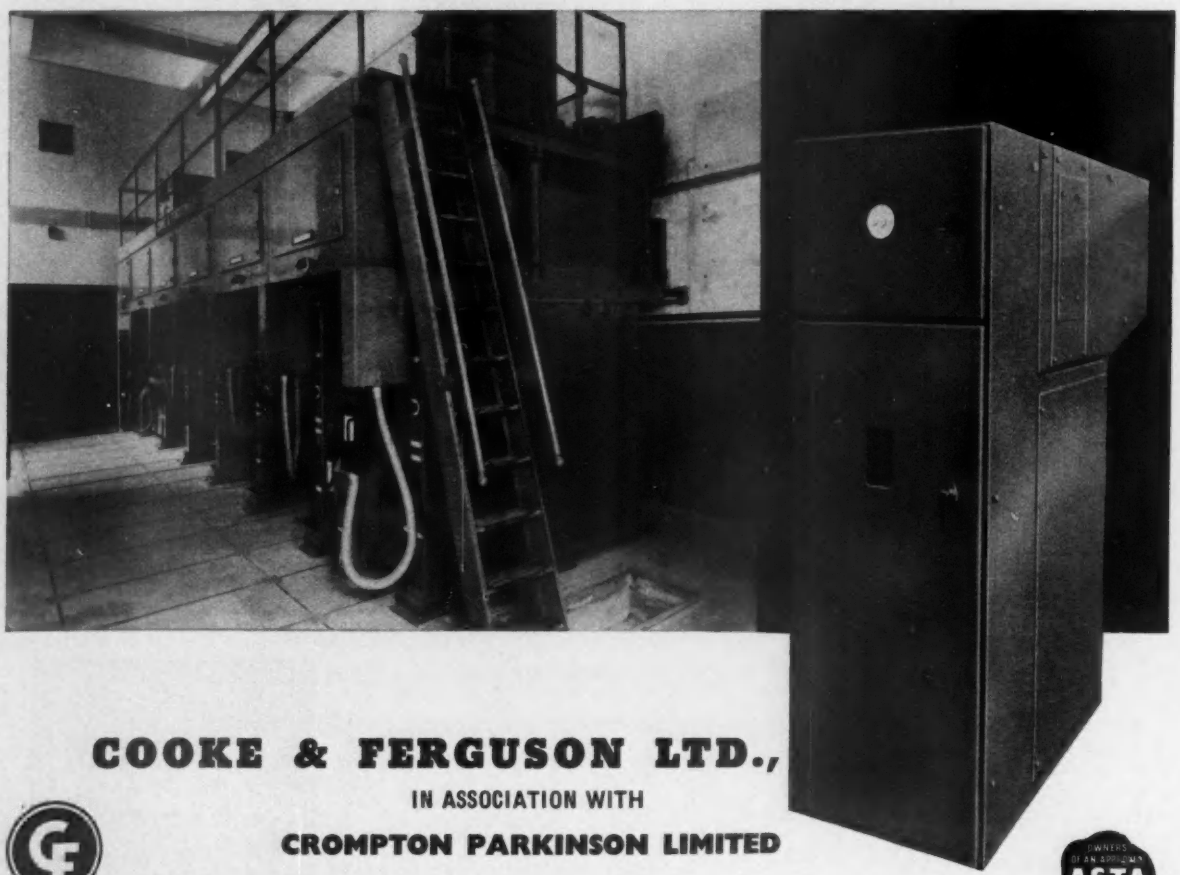
For outdoor or indoor switchgear



... up to and including 66kV



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IN ASSOCIATION WITH
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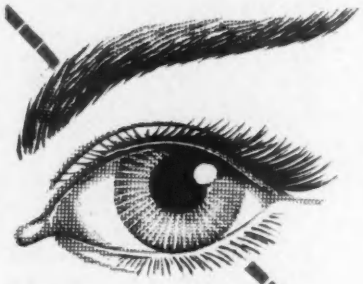
OWNERS OF AN APPROVED ASTA TESTING STATION



The radiant type of hot-plate the house-wife likes to see!

Because you can see the heat. Because radiant heat means fast, clean cooking. Because Backer Radiant Boiling Plates confer all the advantages of radiant heat cooking. Because Backer's speciality is radiant heat. Because Backer manufacture a full range of boiling plates and have a large comprehensive stock to E.D.A. specification at all standard voltages.

Backer

Europe's Leading Heating Element Specialists.

Visit us on Stand C2 at the A.S.E.E. Electrical Engineers' Exhibition, EARLS COURT, March 21st-25th 1961

THE BACKER ELECTRIC COMPANY LIMITED
ROTHERHAM. YORKS. *Telephone; Rotherham 78181 (8 lines) Telex; 54161.*

The compact-reliable-relay with proved performance.

- *Contact Rating* - 25 amp 250 V/ac.
- *Mounting* - Plug in, Side or Panel
- *Terminals* - Fast on or Solder tag
- *Mechanical life expectancy* - in excess of 10 million cycles
- *Compact* - Only 1½" x 1½" x 1⅞"
- *Weight* - 10 oz or less
- *Coils* - A.C. or D.C. Various voltages

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'DIAMOND H' SWITCHES LIMITED
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Registered Est'd 1832 Trade Mark

manufacturers of

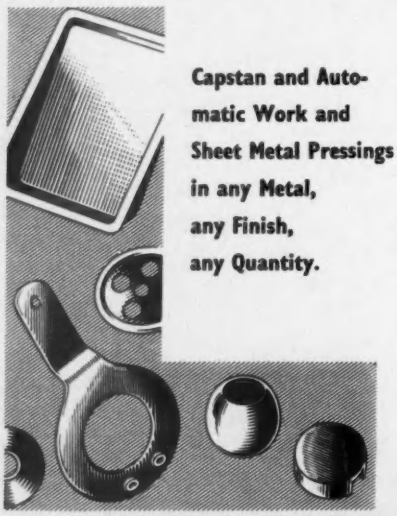
INDICATOR LIGHT FITTINGS
and MULTI-LIGHT UNITS
to requirements

SWITCH and FUSE GEAR
CONTROL CUBICLES
and DESKS

WATERTIGHT
SOCKETS and PLUGS
including HEAVY DUTY
and MULTI-PIN
patterns

Associate Companies:
VERITYS (MAXLUME) LTD. for LIGHTING EQUIPMENT
VERITYS (SWITCHGEAR) LTD. for SWITCH and CONTROL GEAR

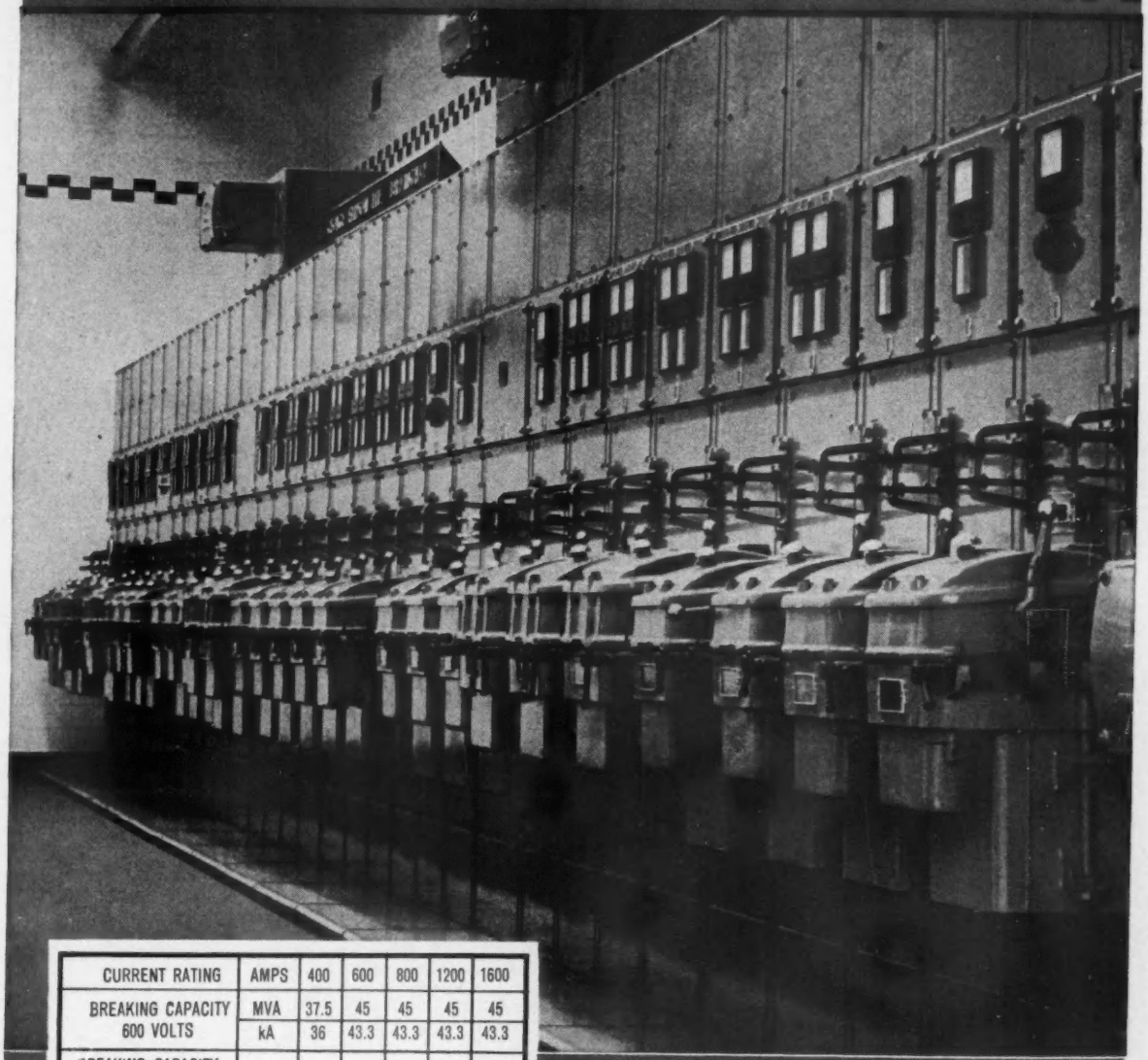
WILLIAM McGEOCH & CO. LTD. (Dept: T.E.) BORDESLEY, BIRMINGHAM 10 also GLASGOW and LONDON



Capstan and Automatic Work and Sheet Metal Pressings in any Metal, any Finish, any Quantity.

GRIFFITHS, GILBART, LLOYD,
AND COMPANY LIMITED
EMPIRE WORKS,
PARK ROAD,
BIRMINGHAM, 18
TELEPHONE NORthern 6221

THE GEO RANGE OF ELLISON SWITCHGEAR



CURRENT RATING	AMPS	400	600	800	1200	1600
BREAKING CAPACITY 600 VOLTS	MVA	37.5	45	45	45	45
	kA	36	43.3	43.3	43.3	43.3
BREAKING CAPACITY AT 400 VOLTS	MVA	25	30	30	30	30
MINIMUM COIL SIZE TO GIVE STATED MVA	AMPS	200	400	600	600	1140
OVERALL WIDTH OF CIRCUIT BREAKER	INCHES	20	24¼	25⅞	28⅜	34¾

TECHNICAL DATA

CIRCUIT BREAKERS
ASTA CERTIFIED TO B.S.116:1952

Horizontally isolated, drawout type for service voltages of up to 660

An engineer will gladly call to give you more information

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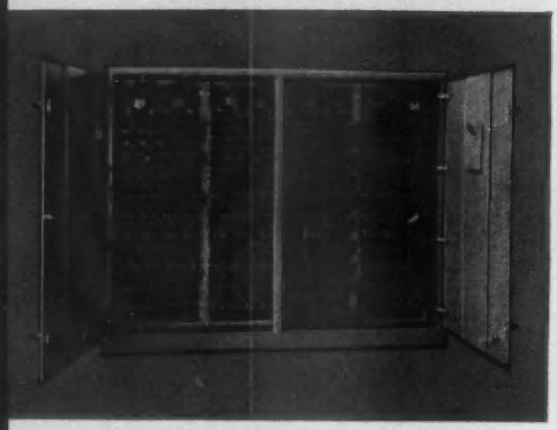

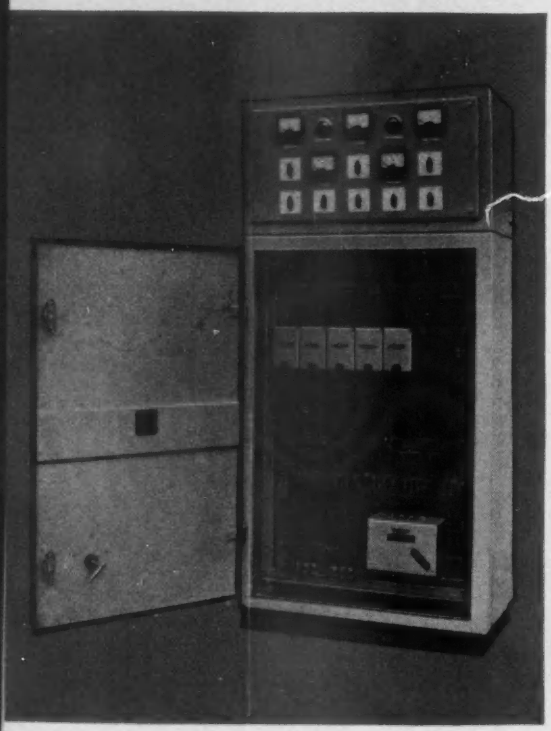

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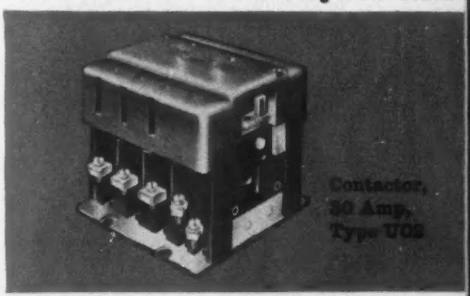
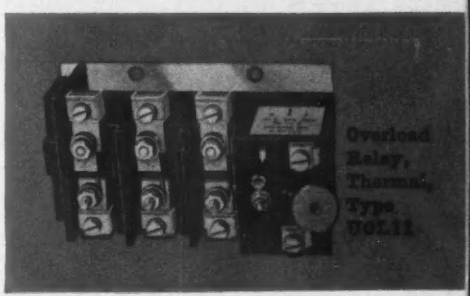
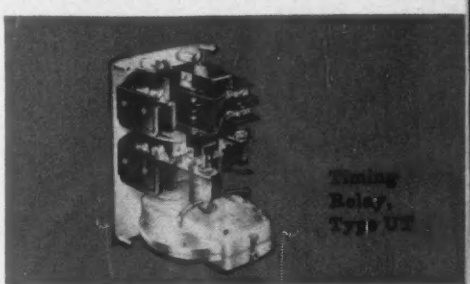


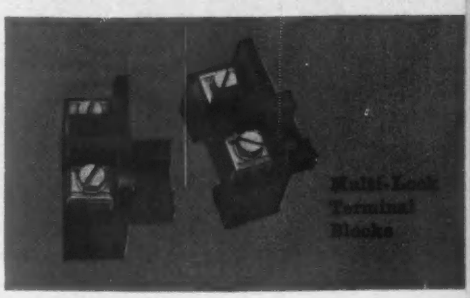
Contactor, 30 Amp, Type UC2



Overload Relay, Thermal, Type UOL11



Timing Relay, Type UT



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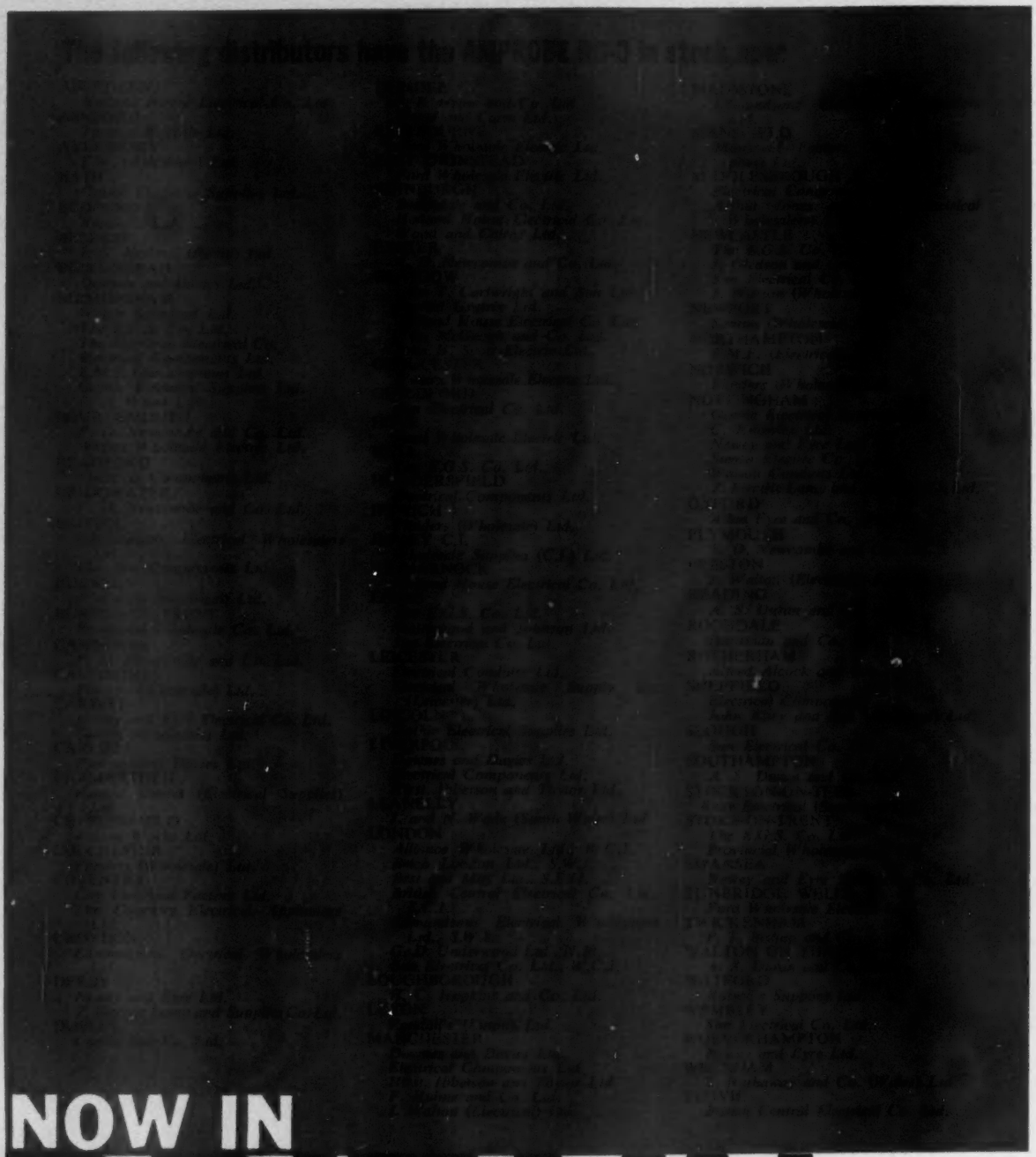

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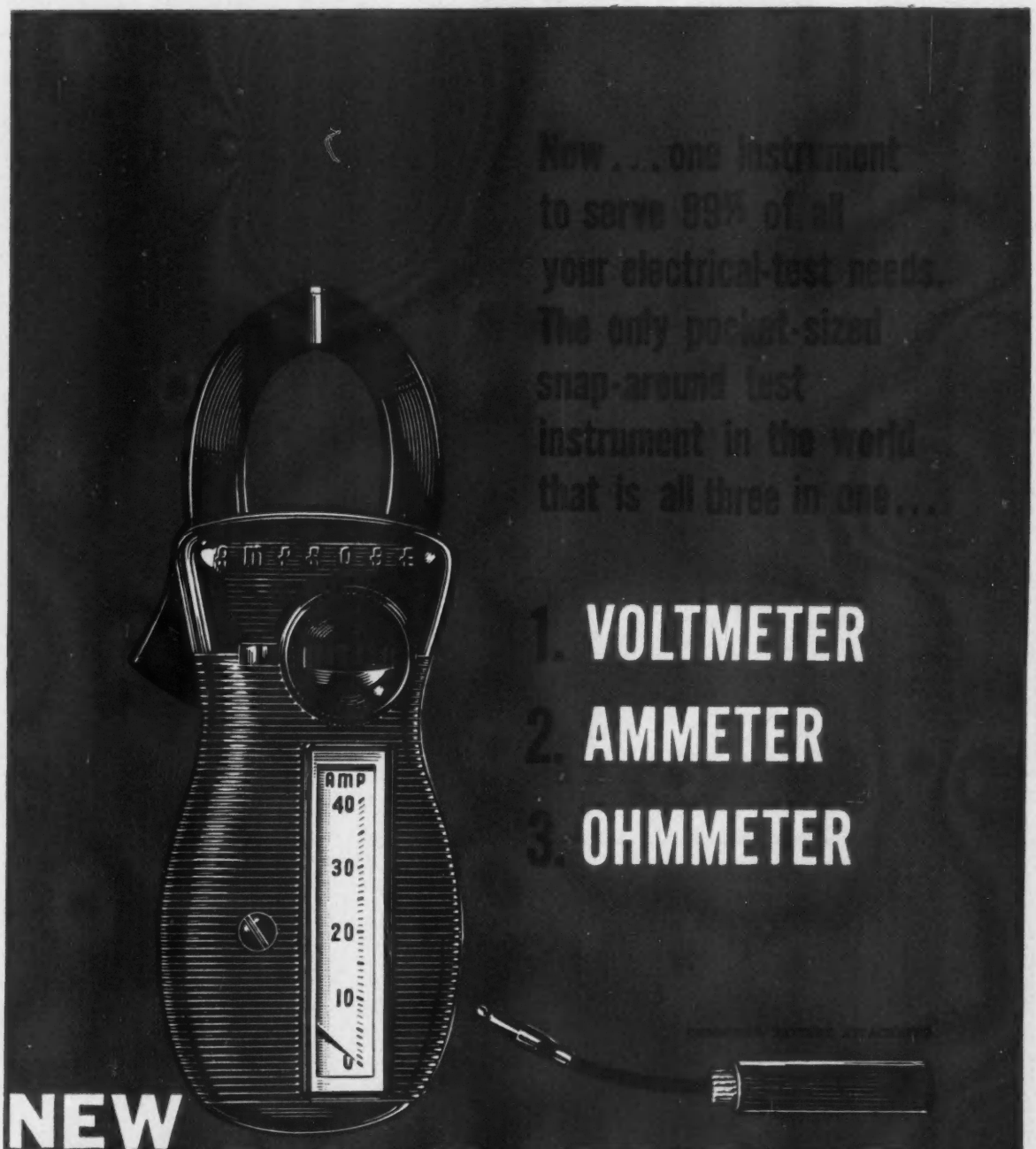

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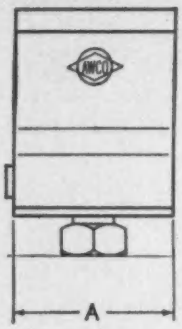

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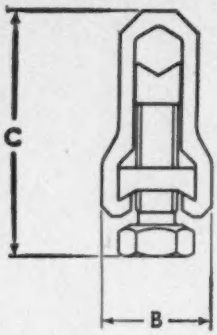
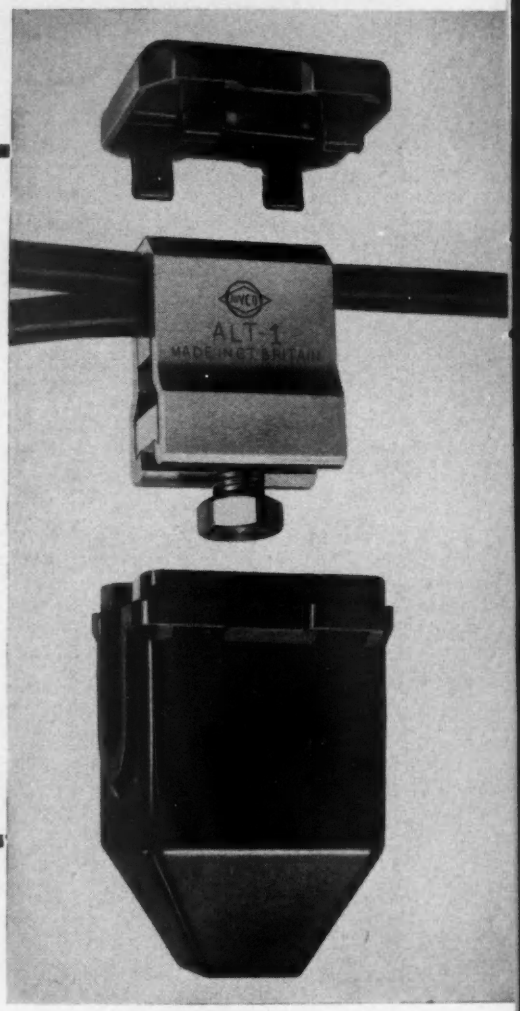
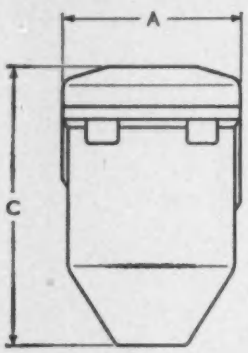
For all-aluminium, ACSR and Silmalec† Conductors



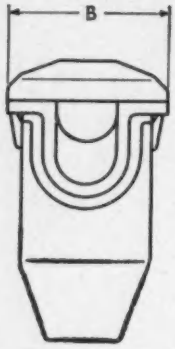
Catalogue Number	Main conductor diameter range	Maximum combined conductor diameters	A	B	C
	in.	in.	in.	in.	in.
ALT-1	0.177—0.366	0.732	1.300	0.875	2.375
ALT-2	0.367—0.558	1.038	1.875	1.175	3.250





INSULATING SHROUD

For ALT-1 saddle tap*



Catalogue Number	A	B	C
	in.	in.	in.
LTS-1	1.813	1.625	2.734
*LTS-2	Insulating shroud for ALT-2 Saddle tap available shortly		

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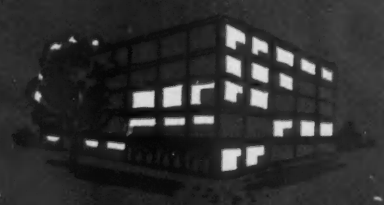

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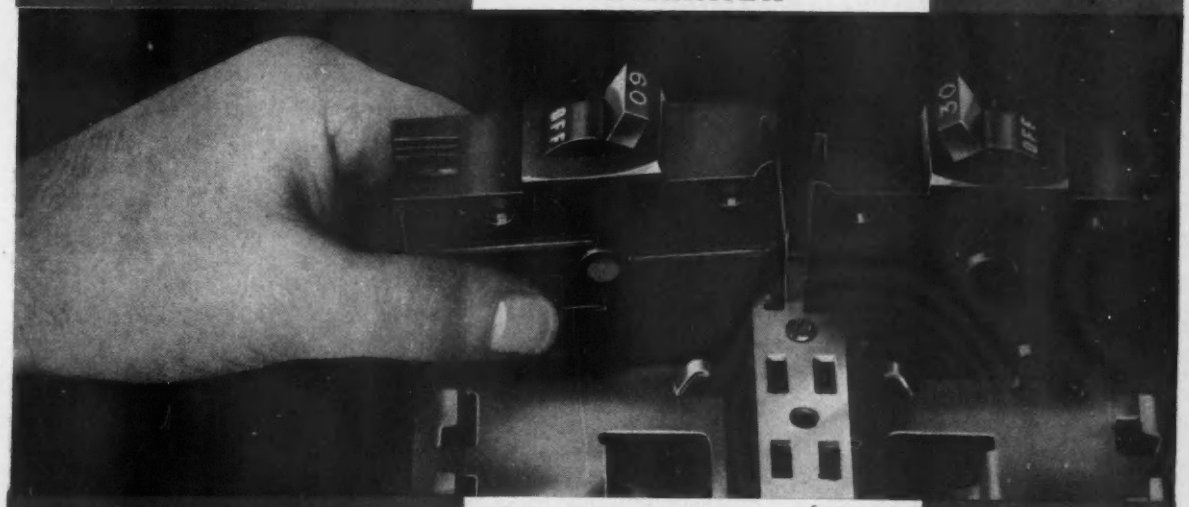

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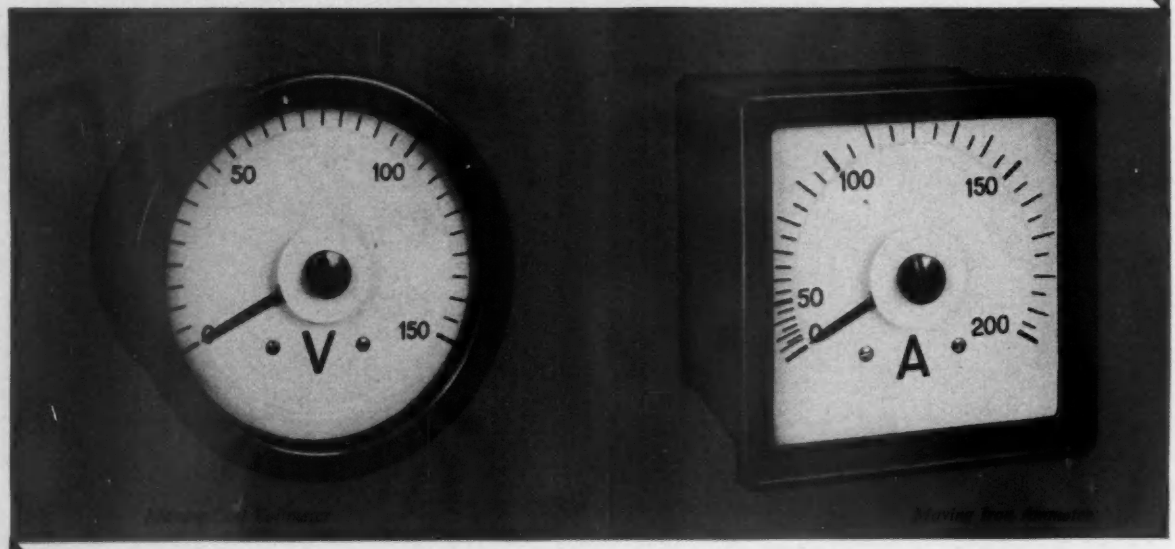

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For literature giving full details, write to:
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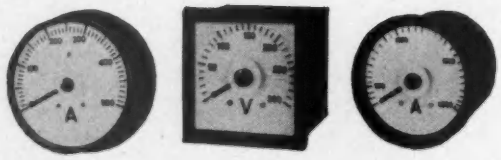

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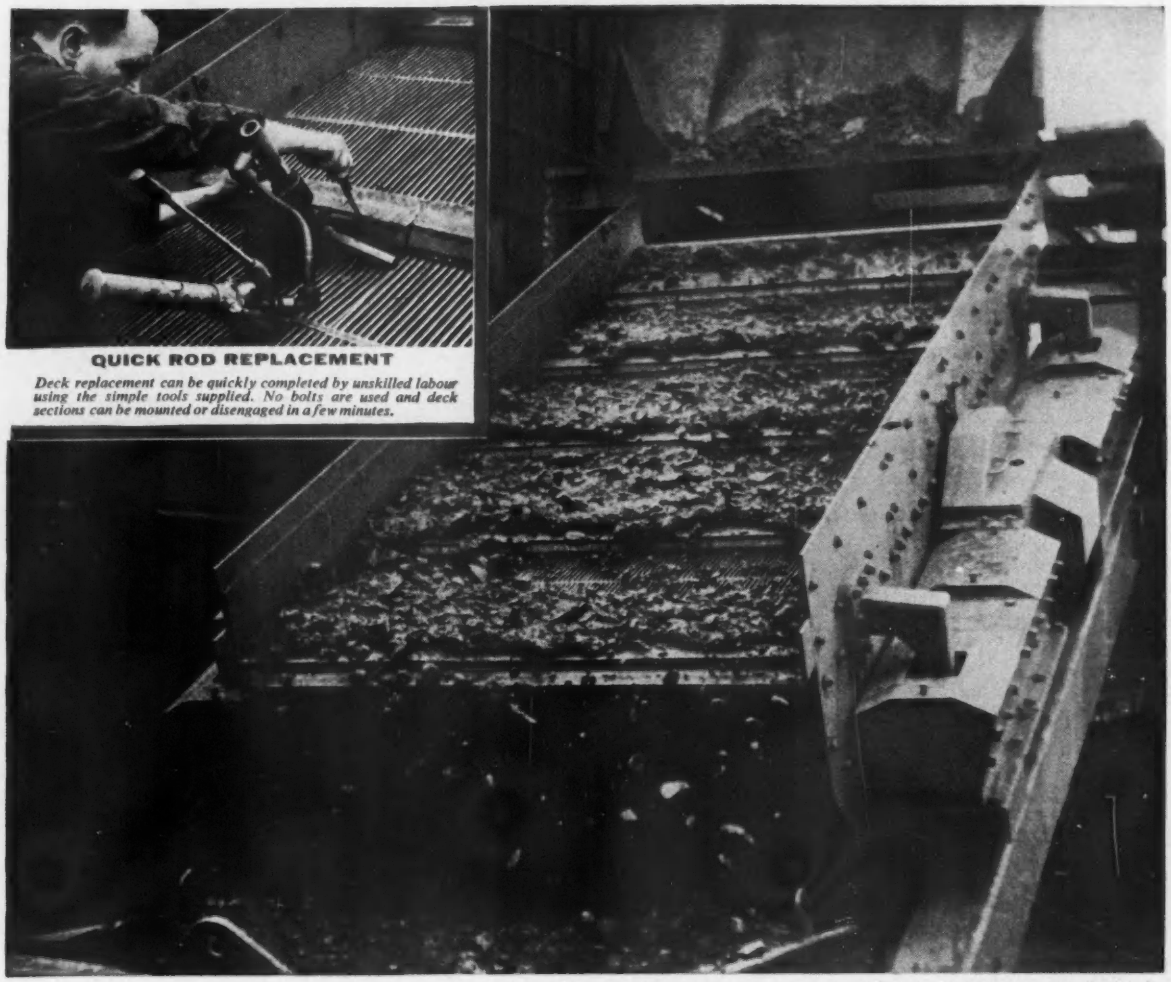

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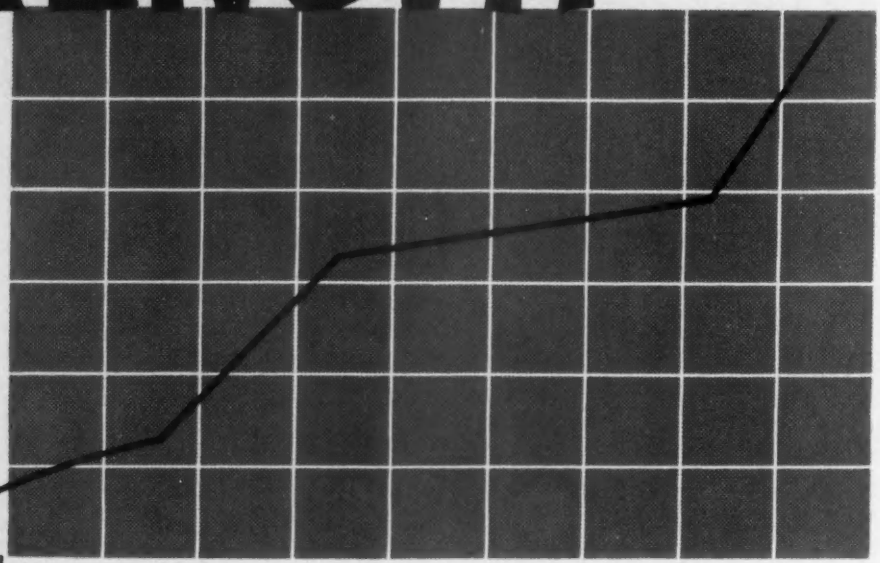

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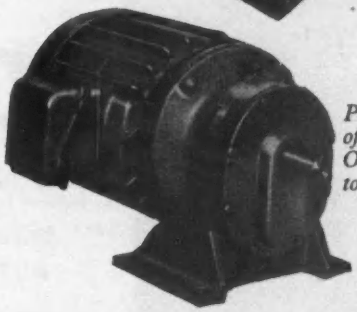

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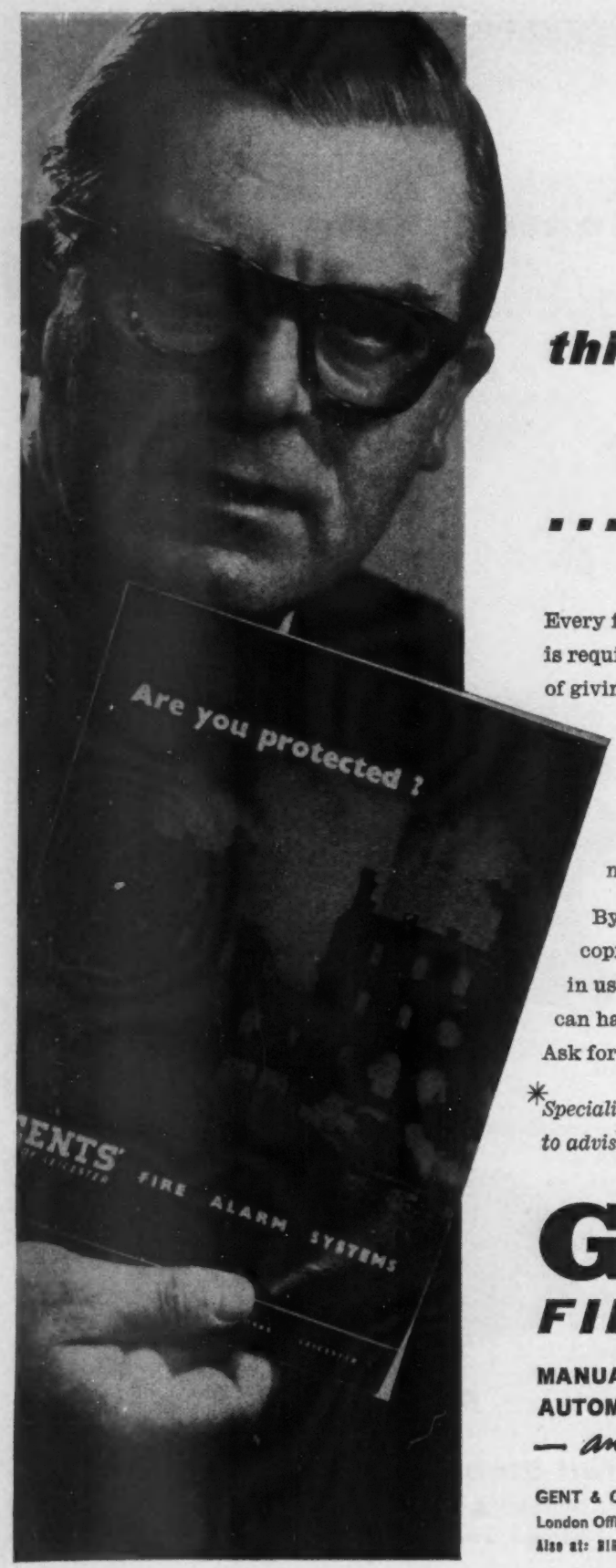

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ELECTRICAL TIMES

SARDINIA HOUSE, SARDINIA STREET, LONDON, W.C.2
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Dans ce numéro

Eléments de chauffage à gaine de quartz 281
On a réalisé des éléments de chauffage consistant en un filament de tungstène placé dans un tube en quartz rempli de gaz inerte; ces éléments ont un débit de 0,5, 1 ou 2 kilowatts. Ils constituent une source de chaleur compacte, susceptible de fournir 1,29 MW/M². Le quartz possède des propriétés avantageuses: un point de fusion élevé, une forte résistance aux chocs thermiques et un faible coefficient de dilatation thermique. Ces éléments de chauffage conviennent particulièrement à l'hôtellerie ou aux locaux industriels, là l'on a besoin d'une source d'énergie élevée.

Homologation des appareils électriques ménagers ... 286
Le "Conseil britannique pour l'homologation des appareils électriques ménagers" (BEAB) a été créé dans le but de vérifier la sécurité des appareils ménagers et de délivrer un poinçon d'essai pour l'estampillage de ceux qui sont considérés comme étant satisfaisants. Le conseil soumet ces appareils à des essais pour s'assurer qu'ils satisfont aux exigences de la "British Standards Institution".

Appareillage électrique pour dépôts pétroliers ... 289
En raison des risques d'explosion inhérents à tous les dépôts de produits pétroliers en vrac, des précautions rigoureuses s'imposent dans la construction et l'emploi de l'appareillage électrique utilisé dans ces dépôts. Les moteurs électriques blindés qui entraînent les pompes doivent être installés, de préférence, aussi loin que possible de la sortie des pipe-lines; ils doivent être commandés à distance au moyen d'interrupteurs blindés ou de circuits "intrinsèquement sûrs". On pense qu'il sera possible à l'avenir d'utiliser sur les pipe-lines à longue distance un dispositif de commande centralisé avec liaisons radio-électriques à ondes ultra-courtes. Ce dispositif assurera à la fois le fonctionnement, la mesure et l'indication, ainsi que l'enregistrement automatique, des commandes commerciales et la facturation automatique.

In dieser Nummer

Quarzumhüllte Heizelemente 281
Heizelemente, die aus in einer gasgefüllten Quarzröhre eingehüllten Heizdrähten bestehen, sind für Nennleistungen von ½, 1 und 2 kW entwickelt worden. Diese Heizer geben eine kompakte Heizquelle ab, die mit 1,29 MW/M² arbeitet. Die Vorteile von Quarz sind ein hoher Schmelzpunkt, Widerstandsfähigkeit gegen schlagartige Wärmeeinwirkung und ein niederer Wärmeausdehnungskoeffizient. Diese Heizelemente können sehr gut für die Beheizung von Kantinen und Wirtschaftsbetrieben sowie von industriellen Baulichkeiten Verwendung finden, wo Heizquellen hoher Leistungsfähigkeit erforderlich sind.

Prüfung von Haushaltgeräten 286
Eine "britische Genossenschaft zur Prüfung elektrischer Haushaltgeräte" (BEAB) wurde gegründet um im Haushalt zur Verwendung kommende Geräte auf ihre Sicherheit zu prüfen und das Anbringen einer eingetragenen Marke an zufriedenstellenden Geräten zu bewilligen. Bei der Prüfung wird untersucht, ob die Erfordernisse des britischen Normeninstitutes vorschriftsgemäss erfüllt wurden.

Elektrische Anlagen in Brennstoffdepots 289
Die Explosionsgefahr, die in allen grosse Mengen von Benzin verarbeitenden Brennstoffdepots besteht, erfordert grosse Vorsicht bei der Konstruktion und Verwendung elektrischer Geräte. Flammensichere Motore, die zum Antrieb der Pumpen Verwendung finden, werden vorzüglich in grösstmöglichen Abstand von den Ausflussenden der Brennstoffleitungen aufgestellt und sollen mittels flammenbeständiger Drucktasten oder mittels "eigengesicherter" Stromkreise ferngesteuert werden. Die Verwendung einer Bedienungszentrale in Verbindung mit Benzinfernleitungen stellt eine für die Zukunft ins Auge gefasste Lösung dar, wobei Mikrowellen-Funkverbindungen sehr wohl zum Betrieb wie auch für Mess- und Anzeigevorgänge in Betracht gezogen werden können; dies könnte mit selbsttätiger Auftragsregistrierung und Rechnungsstellung kombiniert werden.

FEATURES

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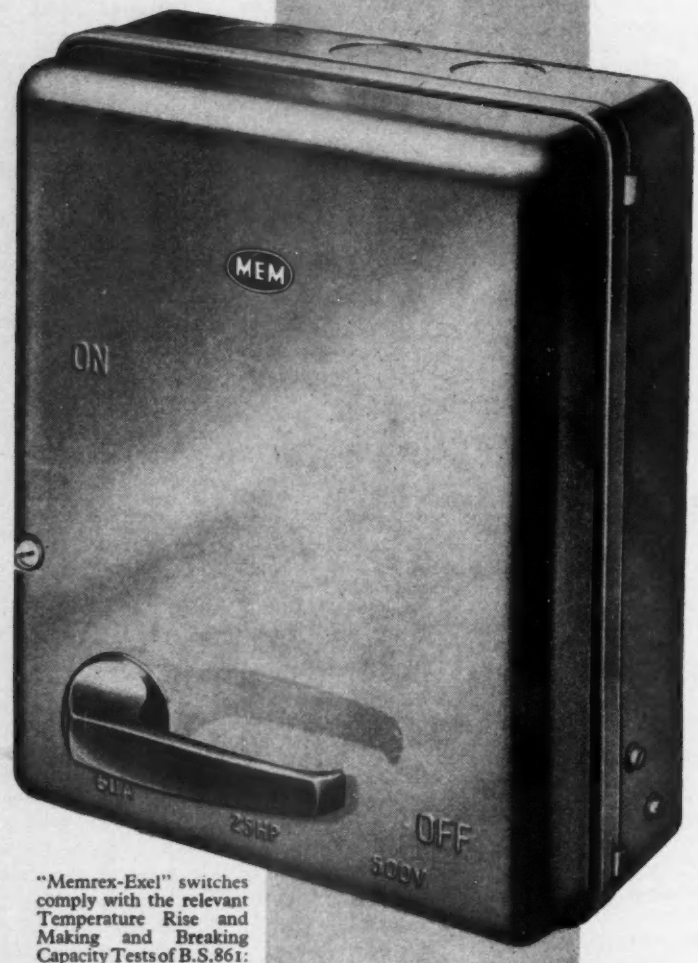

"Memrex-Exel" switches comply with the relevant Temperature Rise and Making and Breaking Capacity Tests of B.S.861: 1955 and B.S.2510: 1954.

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MEM

WRITE FOR LIST 450T

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ELECTRICAL TIMES

ESTABLISHED 1891

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Comment

CONTRACTING IN THE FUTURE

Speeches at last week's diamond jubilee dinner of the Electrical Contractors' Association suggested that this branch of the industry is willing to take major anniversaries in its stride. A brief recognition was accorded to the occasion, but there was apparent a healthy tendency to count the future far more interesting than the past. This was notable in the speech of the president, Mr C. R. Waterhouse, in his reference to the installation side of the industry. Full of work at present, unlike the retailing section, this is none the less facing many anxieties, including the working out of a new industrial agreement that he claims "faces up to conditions as they are today." The contractor has to meet these conditions realistically in ways other than the calculation of what he shall pay his electricians. He has to improve his efficiency to match the increasing demands on skill and the higher cost of labour. The answer lies in mechanisation. Many other types of industry have found their progress there; contracting, like most building operations, has lagged behind. It is seven years now since a notable paper by Mr S. L. M. Barlow described what had been achieved overseas on mechanisation, standardisation of equipment and preplanning of installations, and called for equivalent achievements here. There has been some progress in this direction, but not enough to satisfy. The modern contractor must be prepared to increase investment in plant to match the increased labour content of his pricing. Conditions should permit him to face that cost, but manufacturers of equipment have their part to play as well in promoting its use.

U.S. APPLIANCE BLUES

Despite its greater sophistication, the US appliance market has been showing trends not dissimilar from those in this country. 1960 has not been a good year. Particularly has this been so in the basic high-priced appliances; washer sales are down 18% and refrigerator turnover was the lowest figure since 1950, according to the statistical review published by *Electrical Merchandising*. Average prices were also lower; 3·3% for refrigerators, but this has to be viewed against a saturation of 98% compared with 25% for this country. With sales for replacement steadily running at over 70% of total sales, luxury features such as automatic defrosting are gradually moving down towards the lower price ranges and the trend is likely to be in this direction rather than towards lower prices. The only major appliances to do well were dishwashers; sales advanced and prices were maintained, a happy augury for those firms that are now putting such machines on the British market. In general

it was the smaller speciality appliance that fared best, most of them with a saturation level under 25%, and although their lower cost may make the resulting turnover look less attractive, competition is usually not so fierce. One of the many detailed lessons to be learned from this survey is the 12½% fall over the year in standard food mixers, compared with nearly 10% increase in sales of portable mixers, so that now the total retail value of the smaller appliance sales is nearly 50% greater than that of standard mixers. This popularity of the smaller mixer is also well in evidence on the Continent, but does not seem to have been fully exploited in this country. But what of the prospect for 1961? The US appliance trade is looking to a better year, with the improvement coming mainly in the second six months. So the future outlook also is not dissimilar from that of our own.

B.E.A.B. GETS GOING

Next Tuesday the manufacturers of electric fires, kettles and vacuum cleaners whose products have satisfied the test requirements of the British Electrical Approvals Board for Domestic Appliances will receive a licence to use the approvals mark and an indication of the form it is to take. BEAB will be fully operative, but only when the licensed manufacturers begin to proclaim their success to the public will it be possible to take the next step in evaluating the prospects of BEAB. It seems fair to say that so far the reaction of the domestic appliance manufacturers has been only lukewarm. They have to pay £70 to £80 per appliance for initial certification and thereafter become committed to an annual renewal fee of about £20 to £25. This can represent a tidy sum spread over a lengthy catalogue of products, and it will be faced by the more independent firms only if they can be convinced that test and approval marking is necessary. In the present state of public opinion it certainly seems desirable. If the promised general publicity by the organisations who have set up BEAB is effective, however, the laggards amongst manufacturers are likely to join in fast enough. How the public take to the scheme will be determined partly by the way in which they react to its limitations, notably the restriction of approvals testing to safety aspects, which we have mentioned previously. It is now clear that this is being interpreted broadly; that although there is no test for fitness for purpose, or for quality of performance, any appliance markedly poor in this respect is unlikely to receive approval. This, in particular, is a point that will need careful handling when the industry starts its publicity campaign.

DEPRECIATION ACCURACY

Early in their careers, most engineers receive an introduction to the financial considerations that affect acceptance or rejection of their recommendations. One of these, depreciation provision, is a subject in engineering courses where it looks complicated but straightforward; and afterwards, in every-day practice, where it becomes readily handled, but unsatisfying because it does not align with physical experience. An attempt by one engineer last week to persuade the IEE supply section that he had evolved a general theory of depreciation both intellectually satisfying and practically applicable, met with little success. Speakers in the discussion were for the most part adamant that an arbitrary element in depreciation calculations was unavoidable. Someone went so far, indeed, as to express the opinion that since even the best methods left much to be desired as guides to planning, the right answer was to adopt the simplest method. But, beyond such considerations, there is a further thought worth pondering by any who feel inclined to seek improved techniques of handling depreciation problems. Large engineering plans have, in general, to be considered and decided upon by a board of management which includes non-engineers. Whatever ingenious scheme the designer may have introduced for expressing the true physical significance of depreciation of plant in terms of pounds, shillings and pence, more familiar methods are likely to be applied by the board in coming to a judgment—and that will be the decisive consideration.

FLOOR-WARMING SAFETY

Amongst the batch of official interpretations of the IEE Wiring Regulations which we note this week is one which answers, albeit somewhat inconclusively, a hotly debated detail of floor-warming practice. Is it necessary to have a local isolating switch for the room-heating installation in each room? Provision of facilities for isolation, "suitably placed for ready operation," is one of the fundamental requirements of the Regulations, enshrined in Part I, and destined to take on full statutory authority. But the "suitably placed" requirement is open to much argument and readily sinks into a puzzling morass of definitions. If a non-portable heating appliance is involved, the advisory Part II of the Regulations requires that the isolating switch shall be in the same room; this sounds decisive enough until it is noted that "appliance," for heating apparatus, may imply something having several parts. The interpretation now offered throws back the decision to the designer, but it does offer useful guidance of a common sense kind. If the floor-warming is in premises where anyone concerned will always be able to get at a single isolating switch then all is well. However, in multi-storey buildings let out in tenancies, for example, an arrangement with one isolating switch, perhaps in the sometimes-locked porter's lobby, may not be acceptable. Once more, the well-established but often neglected section of the introduction to the Regulations is brought to mind: the Regulations "are *not intended* to provide for every circumstance; those of difficult or special character will require the advice of a professionally qualified engineer."

Meteor

This week's quick summary of electrical news faces advertisement page 20

Quartz heaters

A VERSATILE HEAT SOURCE

by C. M. JOLLY, B.Sc.*

THE quartz tubular heat lamp developed over the past few years provides the heating engineer with a versatile heat source. It is rapidly gaining favour for both research and industrial applications which require radiant heat at high energy levels. The device is available in a range of power ratings suitable for the requirements of applications ranging from grilling of steaks or poultry in the catering industry to simulation of high-speed flight conditions for aircraft research. Other industrial applications under investigation include use of the lamps for plastics softening, brake testing and paint drying. They are also proving successful as a means of drying and heating with conveyor belt techniques.

Quartz tubular heat lamps have wider application than the more usual type of infra-red lamp mainly because of two properties of the quartz bulb. Quartz has an extremely high melting point, about 1,700°C, and an unusually low coefficient of thermal expansion. These properties have made possible the development of a compact, high energy source which is rugged, able to withstand high external pressures and has excellent resistance to thermal shock. A characteristic of particular value when the heaters are applied to heating and drying with conveyor belts is the low thermal inertia of the unit. The filament cools very rapidly when switched off, reducing the danger of ignition should a fault occur when processing inflammable materials.

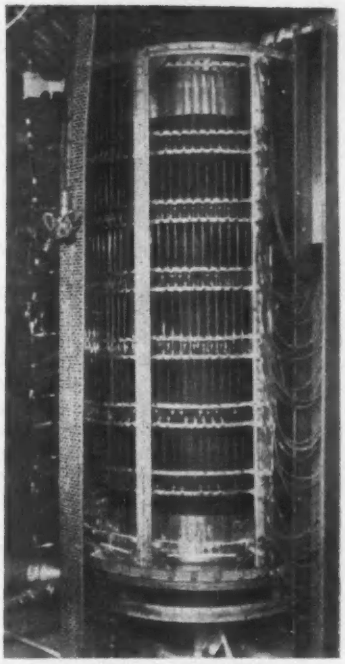


Fig. 1. This battery of quartz tubular heaters, containing nearly 600 tubes, is used for simulating aircraft kinetic heating conditions at the Royal Aircraft Establishment, Farnborough. Photograph by courtesy of the Ministry of Aviation

Heater Construction

The quartz radiant heater consists of a tungsten filament supported at intervals by tantalum spacers and enclosed in an argon-filled quartz tube. The tantalum spacers also act as getters and help to maintain the heat or light output throughout lamp life. The lamps have pressed nickel end caps with perforated flexible tags up to 3 in. long which provide a neat and effective means of electrical connection. The three most popular ratings of quartz tubular heaters available at present are a 500 W, 100/125 V unit and 1 kW and 2 kW units designed for 200/250 V. The 500 W lamp measures approximately 8 in. in length and both the 1 kW and 2 kW heaters 13 in. The heaters are about ½ in. dia.

* Mr C. M. Jolly is Senior Development Engineer, Osram Lamp Division, GEC Ltd.

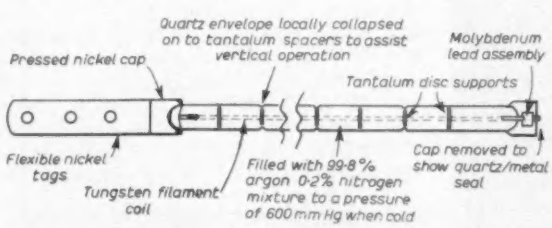

Quartz envelope locally collapsed on to tantalum spacers to assist vertical operation
Molybdenum lead assembly
Pressed nickel cap
Tantalum disc supports
Flexible nickel tags
Tungsten filament coil
Filled with 99·8% argon 0·2% nitrogen mixture to a pressure of 600 mm Hg when cold
Cap removed to show quartz/metal seal

Fig. 2. Construction of the 1 kW, 200/250 V quartz tubular heater. The shape allows close mounting in banks to provide a heat source equivalent to 120 kW/sq ft with a good reflector

Performance of these heaters has been extensively tested under varying conditions. The 500 W heater has a life in free air of approximately 5,000 hr when the input voltage is 115 V. The 1 kW heater life is also 5,000 hr with an input voltage of 230 V. Although the 2 kW heater has a much shorter life, it is still something over 2,000 hr. The heaters can be operated at up to twice their rated voltage but there is then a considerable reduction in life. For example, life of the 1 kW heater falls to about 50 hr when the voltage is raised to 480 V and the corresponding power consumption rises to about 3·5 kW. As they are primarily intended as heat sources, lumen efficiencies of the quartz tubular heaters are kept relatively low, the colour temperatures ranging from about 2,500°K at 230 V to 3,200°K at 480 V.

The shape of the quartz tubular heaters allows them to be mounted in closely packed single- or double-layered banks. Such banks, using 1 kW heaters and a high quality reflector, can produce a source equivalent to 120 kW/sq ft and a power input to a specimen only a few inches away of approximately 80 kW/sq ft.

Quartz has an extremely high resistance to thermal shock so that rapid temperature changes can take place without damaging the heater. Temperature of the object undergoing heat treatment can be accurately controlled

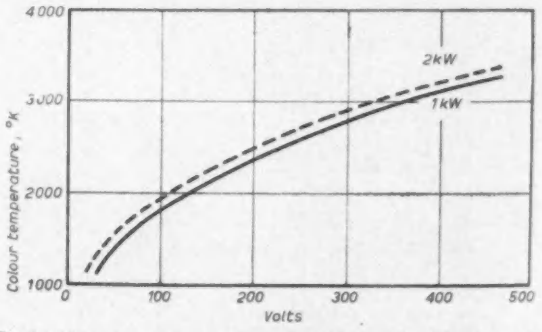


Fig. 3. Colour temperature/voltage characteristics of the 1 kW and 2 kW quartz tubular heaters

either by regulating its surface temperature or heat input. The heat input regulation method is more refined and uses a heat signal, measured on the object's surface by means of a radiometer and fed back through a computer regulator system, to maintain the desired power input to the heater source at any particular time.

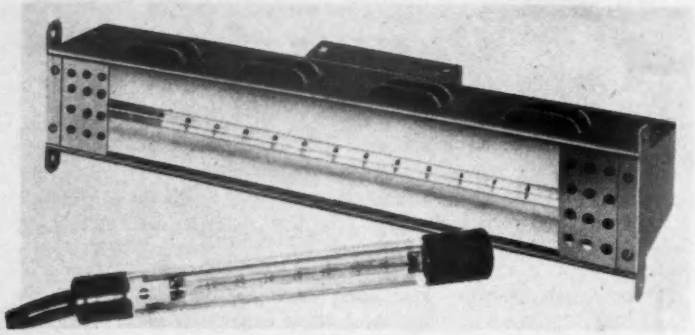


Fig. 5. A typical reflector fitting for a quartz tubular heater shown with a prototype underwater fitting for a quartz lamp

Manufacturing Problems

The thermal properties of quartz have produced several manufacturing problems which have been the subject of research for many years. One of the main difficulties has been to devise a suitable vacuum-tight quartz/metal seal for this type of heater. An electrical conductor is required which has a sufficiently low thermal expansion to match that of the envelope. The method currently employed was originally developed for quartz discharge lamps and uses molybdenum. The thermal expansion coefficient of this material is relatively low for metals, about 5×10^{-6}/°C, but it is still more than ten times greater than that of quartz. Making these different expansion rates compatible is achieved by utilising a wafer-like foil of molybdenum, about 30 microns thick. The foil has insufficient strength to exert any appreciable mechanical force in the seal during temperature changes. This and other associated problems, such as the high temperatures required for working quartz, have hitherto restricted its field of application, but experience in both manufacture and manipulation has led to improved mechanical processes with consequent reduction in production costs.

Intensive research in the Osram Incandescent Lamp Development Laboratory, aimed at solving the many problems encountered in customers' applications, followed the initial design of the quartz tubular heater. For example, the dark space between the end of the filament and the cap has been considerably reduced without impairing the heater quality, a point of considerable importance when a uniformly heated surface is required from rows of heaters mounted end to end. Anchoring of the tantalum spacers has also been improved to prevent any chance of "disc migration" under vibration. The original heaters could only be mounted horizontally, because the filament tended to stretch rapidly if mounted vertically. A modification enabling the heater to be mounted in a vertical position can now be incorporated in the design.

The effect of high ambient temperatures on metal in the quartz/molybdenum seal has been thoroughly investigated. At temperatures above 350°C to 400°C molybdenum quickly oxidises, causing lead wires to break. Great strides have been made in solving this problem and recently heater life at 650°C has been increased about tenfold. It can be appreciated that this advance is extremely important in the majority of applications.

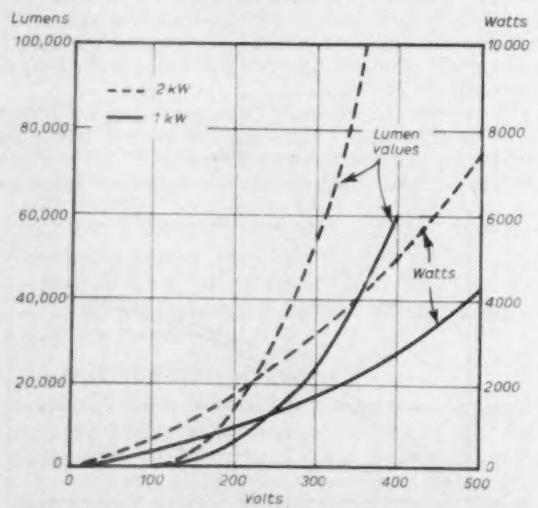


Fig. 4. Lumen and watt rating of quartz tubular heaters as functions of voltage. Although not primarily intended as a light source, for certain applications their resistance to thermal shock and high pressures are valuable features for use as lamps

Aircraft Development

Originally, development work on the quartz tubular heater was largely centred on applying this type of source to simulating the heating effects encountered by high-speed aircraft and missiles. This technique is being developed extensively by the Royal Aircraft Establishment at Farnborough, and many leading aircraft companies throughout the world. The radiant heat method is only one of the many used. It also has applications for determining stresses in structural materials and simulating tropical or high temperature conditions for machinery and consumer products. To take the aircraft industry as an example, it is well known that at supersonic speeds intense heat is generated by air friction and compression. The skin temperature of an aircraft rises until heat radiated from it is equal to that being absorbed over its surface. The resulting temperatures can cause high thermal stresses which seriously reduce the strength of the materials used. Resultant loss of structural stiffness on the wings or control surfaces of an aircraft may give rise to aerodynamically excited vibrations which could cause failure. Simulating such conditions involves working with very high temperatures. For example, at a speed of Mach 2 and a height of

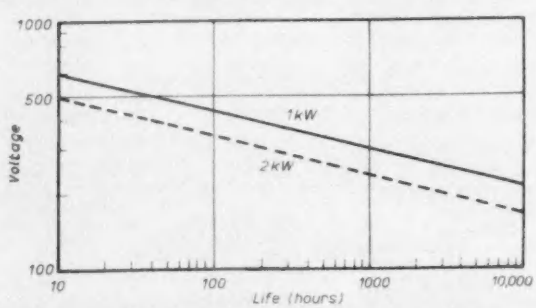


Fig. 6. Although heaters can be operated at twice rated voltage their life is considerably reduced, as shown here

30,000 ft a skin temperature of about 150°C is experienced, whilst at Mach 10 and 50,000 ft the temperature would rise to nearly 4,000°C.

For testing components intended for aircraft structures, and products which are subjected to high temperature, the quartz tubular heater as a method of producing high temperatures has several advantages. Full-size structures or portions of them can easily be tested, enabling the element of unreliability introduced by scaling factors to be eliminated. The technique is also relatively inexpensive and simple to apply.

Lighting Applications

Clearly, in devices of this type, the distinction between the terms "heat source" and "light source" is somewhat arbitrary and is related to the colour temperature of the filament. By modifying the filament geometry, quartz tubular light sources of moderate efficiency and lumen maintenance have been produced. A 2 kW source with an initial efficiency of 18 lm/W has a lumen maintenance of about 50% after burning for 200 hr. For certain applications this device offers advantages over the ordinary glass envelope sources. For instance, it can be used with long parabolic reflectors and will withstand high external pressures. Resistance to thermal shock allows the lamps to be used outdoors in unprotected fittings. In addition, the cost of fittings and control gear can often be considerably less than that for discharge lamps. Typical uses being investigated are area floodlighting, underwater television and deep-sea salvage work. Lamps have been tested successfully up to pressures of 2,000 lb/sq in., equivalent to a depth under water of about 4,000 ft.

One of the long-standing problems associated with tungsten filament lamps, particularly those running at relatively high colour temperatures, is failure due to excessive rate of filament evaporation. Localised loss of metal produces "hot spots" on the filament coil, causing further rapid tungsten evaporation and subsequent filament failure. Another problem is that the deposition of filament metal on the walls of the envelope quickly reduces light output.

The filament evaporation rate can be modified by a regenerative process involving the introduction of a small controlled quantity of iodine into the lamp envelope. By this means, a reduction in the loss of tungsten by evaporation can be achieved at a given operating temperature. The vaporised tungsten combines with iodine in the region between filament and bulb, but dissociation occurs in the high temperature layer very close to the filament and the liberated tungsten returns to the filament coil. The maximum effect appears to be produced when distance between the bulb and filament is short and the envelope wall temperature comparatively high.

Clearly, the quartz tubular design fulfils these conditions and a lamp can thereby be envisaged which will have a light output greater than conventional general lighting service lamps, yet maintain comparable life.

Infra-red beam may transmit TV

THE possibility of transmitting telephone and television signals on carrier waves of infra-red radiation is one of the by-products presaged by the development in the USA of an optical maser.* Perhaps devices of this type will, in the future, solve the problems of crowded bandwidths.

The maser enables a highly directional beam of infra-red radiation to be generated, not only continuously, but also within a frequency band said to be several hundred-thousand times narrower than has previously been possible with any other radiation source.

Two valuable properties of infra-red radiation are its highly directional nature—a spread of less than one minute of arc is obtained—and the wide bandwidths possible, with carrier frequencies which would allow transmission of large amounts of information. The directional properties mean that the beams travel in straight lines, although it may be advantageous to transmit in some form of tube with deflecting mirrors. Already, it is claimed that broadband modulation has been achieved at frequencies up to 60 kc/s, by using the Kerr cell, which is an electro-optical device.

The optical maser was developed at the Bell Telephone Laboratories. It consists of a tube containing a mixture of helium and neon gas. When an electrical discharge flows through the mixture it excites the helium molecules to a very high energy level or "metastable" state. At this energy level they would not normally radiate energy, but when the excited helium atoms collide with neon atoms, energy is transferred to the neon atoms and these can then be stimulated to radiate their energy, on demand, in a continuous stream. The tube has semi-reflecting end-plates which, while continually reflecting and augmenting most of the beam internally, allow a very narrow beam in the form of infra-red radiation to pass through.

The power required to excite the maser is said to be of the order of tens of watts, and the output power is in the region of 1/100 W. Up to 30 discrete frequencies can be radiated by the neon maser within the range 9,000 A to 17,000 A. Other gas mixtures are expected to yield different output frequencies.

For the physicist, the maser offers a valuable tool for examining atomic structure and, because of the extremely sharp line, for accurate spectroscopic work.

A coherent beam of infra-red radiation is produced by this 40 in. long maser tube containing helium and neon gas

* A maser is an amplifier or oscillator which uses electromagnetic radiation to interact with molecular systems and raise them to an energy level above their normal thermal level.

Messrs L. C. Penwill, G. N. Walker, Sir Hamish MacLaren, E.C.A., President C. R. Waterhouse and Mr Norman Collins

Sixty years of contracting

E.C.A. DIAMOND JUBILEE DINNER

SIXTY years of activity to co-ordinate the interests of electrical contractors was marked last week at the annual dinner of the Electrical Contractors' Association and its allied associations. It was in 1901 that the ECA became an organised body on a national scale, the Board of Trade charter which accounts for the "Incorporated" which appears in the full title being granted in 1904.

Such historical notes opened the speech by the president, Mr C. R. Waterhouse, J.P., of Sheffield, when he replied to the toast of the ECA and allied associations which had been proposed by Mr N. Collins. However, from such appropriate historical reflections the president soon turned to consideration of topical problems. The electrical industry, he said, was faced with a difficult transitional period. Whilst on the one hand the flood of installation work was "tremendous and apparently inexhaustible," there had been a substantial recession in sales of domestic equipment. There were as yet no visible signs that the period of recession was coming to an end. He was personally confident that it was temporary—although contractors and retailers should not be content to sit back and wait for that outcome.

Reflecting on exhortations to export, Mr Waterhouse underlined his belief that a sound home trade was the basis for export expansion. Manufacturers were entitled to expect from the electrical contractor and retailer the fullest measure of co-operation in the development of such home trade. This involved the retailer in equipping himself to ensure a consistent and increased public demand for domestic appliances.

Contractors who took a direct part in the export effort by undertaking electrical installation work overseas had suffered from failure of manufacturers to keep delivery promises. This deficiency needed to be remedied as soon as possible. For contractors, the question was not simply one of delay. It involved enormous wastage which arose from employment and payment of labour, which was frequently rendered idle by the manufacturer's failure to keep his promises.

Although on the installation side of the industry demand exceeded supply, this was no reason for complacency. The industry had to improve its efficiency, to introduce mechanisation on an ever-increasing scale, and to secure the greatest measure of productivity. In this respect, "the real significance of the new industrial agreement which

1, Mr I. C. Penwill and Sir Robertson King; 2, Messrs L. J. Holloway, D. B. Irving and J. G. Briggs; 3, Mr. S. Dickinson and Professor F. Sewell Bray; 4, Sir Hamish MacLaren and Mr A. V. Milton; 5, Messrs V. Ferens and J. D. Nicholson; 6, Messrs L. C. Penwill and J. G. Briggs

came into operation on 1 January is that we have looked at the industry as it is today; and we have faced up to the type of work upon which we are engaged and the varying conditions in which it is undertaken."

The Association was anxious to extend co-operation to all sections of the electrical industry. It had ideas as to how other sections could assist it, but co-operation ought not to bring advantages to one side only. He invited other organised sections of the industry to tell the ECA in what practical and constructive way the ECA could help.

In proposing the toast of the Association, Mr Norman Collins, the well-known novelist, who is deputy chairman of ATV, had made a light-hearted speech which kept the large assembled company amused, even though it offered little recordable comment on electrical topics.

The toast to the guests was proposed by Mr G. N. Walker, vice-president of the ECA, and attracted, as is traditional, a response from the president of the IEE, Sir Hamish MacLaren. Sir Hamish recalled that his professional life had been spent largely in Admiralty service, and that during it he was able to put to the test the claims made by the Association on the wiring standards of its members. Not all shipbuilders, he said, had their own electrical installation sections, and he had learned to have confidence in the installations carried out in ships by ECA members. Almost every minesweeper built in recent years was the responsibility, so far as its electrical equipment was concerned, of private contractors—and the complexity of the wiring in a modern minesweeper was comparable to that of a destroyer in early war years.

Joining Sir Hamish in responding for the guests was Mr D. E. Gibson, Honorary Secretary of the RIBA, and now Director-General of Works at the War Office, after many years in town planning at Coventry. He expressed strong opinions on the wastefulness of competitive tendering in the building industry. Parliamentary committees, ratepayers and taxpayers thought competitive tendering was giving them value for money, but those directly concerned could not help considering the system "one of the most wasteful sources of overhead costs ever invented." It involved an appalling amount of work amongst those who tendered and did not receive orders.

Mr Gibson went on to suggest that once a year all organisations controlling building on a large scale might seek for the right contractor for their programme of work, fix the applicable rates, and over the following two years negotiate contracts on the basis of those rates. This would give good continuity of work and labour, and would be well worth while as an alternative to the knock-down basis of tendering which dissipated effort and labour and time. The RIBA and the ECA might progress together along such lines.

1, Messrs A. Haddock, D. Bellamy, C. R. Waterhouse; 2, Messrs B. W. Pickup, R. H. Scholes, T. E. Daniel and C. A. Zweigbergk; 3, Messrs A. V. Milton, G N. Walker and C. G. Hyams; 4, Messrs S. F. Steward, V. J. Stock and N. Aish; 5, Messrs S. Dickinson, A. F. Plummer and C. J. Veness; 6, Messrs N. F. Marsh, H. S. Wathes and W. J. Bird

Marked approval

BRITISH ELECTRICAL APPROVALS BOARD IN OPERATION

AT the end of this month the British Electrical Approvals Board for Domestic Appliances will issue its first lists of safety-tested domestic appliances. Manufacturers will then have the right to carry the Board's mark on the products concerned. In coming months, the scheme will spread to cover the full range of electrical domestic appliances, and the mark will become known throughout the British Isles.

What is the organisation and practice of this latest addition to the British electrical industry? The housewife buying a toaster at her retailer's will be influenced only by the reputation the BEAB mark earns. How that reputation stands will depend essentially on the way the Board and its officers administer a test and inspection scheme, the principle of which has already received the blessing of the Molony Committee on Consumer Protection.

Formal Structure

BEAB is centred on some of the most firmly established bodies of the electrical industry, but draws additional support from outside interests through its council. This council, under the presidency of Lord Citrine, finds its membership not only from the manufacturers' associations, contractors, and electricity supply interests, but also from such organisations as the National Chamber of Commerce, BSI Women's Advisory Committee and the Home Office. It is at council level, too, that liaison will be formally maintained with the industry's other safety-seeking specialist, the NICEIC.

The council, however, is not a directive-issuing body. It is advisory. Executive power is centred on the British Electrical Approvals Board itself, which, under the chairmanship of Mr T. E. Daniel, North Western Electricity Board chairman, represents EDA, BEAMA, BSI, ECA and EWF. The Board is being financed initially by industry-advanced loans; but in the long run, it is to be self-supporting as a self-accounting, non-profit-making enterprise, answerable to no single set of interests, and paying its way by charges for testing appliances, and fees for use of the BEAB mark.

Staffing

Pivot of the Board's activities is the director, Mr. C. A. Zweigbergk, C.B.E., M.C., M.SC.(TECH.), M.I.E.E., who has come from Army and Ministry of Aviation test experience to start from the beginning what should grow into one of Europe's most impressive electrical test organisations. At his headquarters near Trafalgar Square, he has a small administrative and engineering staff which must grow in time but which at present bears visible witness to the Board's intention to make haste slowly.

Key to this policy is use of existing laboratories for the test work which is at the heart of the BEAB plan. Reliance is to be placed on the facilities (which are being extended) and the experience of the existing EDA test-house at Leatherhead, and on links that laboratory has built up with area board test sections. The services that BSI can offer are also being called in aid, notably the organisation set up in connection with the scheme to provide Canadian Standards Association approval through test and inspection within the British Isles. At some time in the future, BEAB may have to consider setting up its own laboratories—but not yet.

Approvals Criteria

One of the most anxious tasks of the new organisation was to establish the basis on which it would offer approval. A wide choice of criteria are available to those who would persuade the general public to hand over some of the *caveat emptor* functions it must exercise in its daily buying. Value for money, fitness for task, visual quality of design all have their adherents. For BEAB, the choice fell squarely on safety.

The choice of safety as the approvals criterion and the implied rejection of judgment on quality and performance, have been misunderstood by some critics of the BEAB plans. A more extended examination of the arguments for this choice removes the sting from some of the criticisms most strongly voiced.

First, BEAB argues that is must remove merchandising judgments from its approvals criteria, because the former change over the years and, being in so many ways concerned with value-for-money, are unsuitable for rigid specification. What is capable of that precise specification is safety. Somewhere between these extremes comes "fitness for purpose," sometimes called "performance quality." About this, BEAB adopts only an indirect approach. However, if an appliance is tested for compliance with a safety specification of reasonably high standard, then its quality of construction is virtually certain to be free from the shoddiness which so often goes with poor performance. But BEAB intends to go still further. Not only safety.

Director of BEAB is Mr C. A. Zweigbergk, C.B.E., M.C., M.Sc.(Tech.), M.I.E.E.

but durability of safety has to be confirmed in testing conducted in accordance with precisely worded specifications.

At this point, another policy decision became necessary. Who was to produce the specifications? BEAB decided not to act as examiner as well as mark the papers. British Standards are to be the basis of all testing, a decision implying full industry and user co-operation and compromise in the drawing-up of detailed requirements. BEAB, indeed, may initiate the requirement on a particular standard, but the full procedure of drafting committee and industry council approval will be gone through.

So BEAB's criteria will be independently determined.

For convenience, all safety clauses of British Standards relating to electrical appliances are in course of being co-ordinated under a common reference, BS 3456. There are to be two standards covering general safety requirements for cooking and heating, and motor-driven appliances, respectively. In addition, the safety clauses for individual types of electrical appliance will be issued separately. This re-arrangement of standards is providing a convenient opportunity for giving attention to such points as closeness of conformity with CEE and other international specifications.

Approvals Practice

So much for general policy. How does the scheme work? In discussing this point, a distinction must be drawn between what will be the routine once the scheme gets going and the special arrangements decided on. The more general arrangements can usefully be considered first.

When a manufacturer requests approval for an appliance he is first asked for certain technical details, such as sales literature and general arrangement drawings. This information is then examined by headquarters' engineering staff to check that there is a reasonable chance of the appliance being approved. If all seems well, instructions are sent for a sample to be dispatched to a test laboratory; while if a sample is not called for, every attempt is made to tell the applicant just where his product is falling short of BS requirements.

At the test laboratory, examination and testing of the sample is carried out according to the appropriate British Standard. This is, for many appliances, a lengthy operation. It may involve extensive heat runs, visual examination to check safety factors of internal design, and mechanical shock testing, as well as such obvious electrical tests as insulation and loading.

If all proceeds satisfactorily, the laboratory in due course reports to the director of BEAB. On his recommendation, the case is then submitted to the certification committee representing the Board for final decision on the granting of a licence for the appliance involved to carry the mark of approval.

What, however, if the test is failed? Does that involve summary rejection of the appliance? In general practice, the answer to this anxiously posed question is, no. Present arrangements are that the director is informed at once by the laboratory if an appliance fails the test, and if the failure seems of a minor nature, perhaps relating to construction of the particular model being tested rather than to the design, then appropriate corrective action may be permitted. If the failure is more serious, submission of a modified design of appliance may be necessary and then the full test must be carried out again.

If failure is so fundamental that the appliance cannot be approved, then a recommendation to refuse approval goes to the certification committee representing the Board. In this case, as in all others, there is formal power of appeal to the full Board available to manufacturers, but it is expected that any points of dispute will, in fact, be clarified and resolved by corrsepondence at an earlier stage. One of the possible sources of dispute, interpretation of the individual clauses of a specification, is the concern of a technical committee under the director's chairmanship.

Whatever the result of testing, it is notified only to the manufacturers submitting the samples. Details of samples are handled confidentially by the administrative and engineering staff of BEAB, and test reports are considered by the certification committee (which may, of course, have members representing organisations competitive with the manufacturers) under code numbers to preserve commercial security.

To streamline this arrangement in the early days of the scheme, the appliances are being called up in groups. The intention is to preserve equity as between one manufacturer and another by announcing approval on a fixed date for all manufacturers who have submitted samples. In this scheme, electric fires, kettles and vacuum cleaners, are now tested, with the intention of notifying manufacturers of results by the end of this month; and shavers, toasters, coffee percolators and wash boilers are the subject of tests designed to permit simultaneous announcement of approval on 1 May. Appliances in these categories which are on the EDA list of approved appliances and so have been subjected to extensive tests of the kind envisaged by BEAB, are unlikely to be called up for tests. However, their exemption is not automatic. If approval was granted some years ago, or there seem to have been substantial changes from the appliance as it was at the time of approval, testing may still be required.

Maintaining Quality

Approval and consequent test marking will not be a once-for-all operation. It is an inherent element in the BEAB scheme that there should be an annual test of each appliance and that a watch should be kept for design alterations that are significant from the safety aspect. The regulations of the Board, which applicants for approval are required to accept, require that manufacturers shall notify the Board if they contemplate in any way changing a product which has been approved. Practice in this respect has still to be built up. The BEAB engineering section would not welcome the shower of paper-work that would be involved if every modification slip going through a manufacturer's works were repeated to them, whether the change involved was significant or not. The hope is that, by personal contact with manufacturers' representatives, common ground can be reached about the level of change at which information will be required—although the reserve power of the absolute requirement for notification of every alteration remains in the regulations.

A safeguard exists against unnotified changes in the annual re-testing of approved appliances. The Board will notify licensees when a sample for re-test is required, which will be about once a year. Probably the manufacturer will be required to supply the sample, although it might be preferable, and may be possible, if this were taken from the production line by a representative of BEAB (or one of its BSI agents). The point at issue here is that the sample should be obtained from the manufacturer, not from a later distributive stage, since it is with the manufacturer that BEAB is concerned. The sample secured will be sent for test, but not necessarily for the full range of BS tests unless changes have been so substantial as to make this necessary. It is at this stage, of course, that BEAB will be able to check whether too little information has been given about modifications.

The Cost

The basis of BEAB financing has already been mentioned; fees to cover the cost of testing plus administrative overheads. How much is charged for approval testing depends, then, on the details of the British Standard concerned. For example, a shaver at £55 costs as much as the larger wash boiler, while the simpler tests necessary with an electric fire reduce the charge to £45. Once approval has been completed there is a further charge for a certificate, of the order £20 to £25, and thereafter an annual renewal charge of the same amount.

Getting the Mark Known

It is clear that the BEAB mark will have little value unless the public is told clearly what it means. One of the first policy decisions taken by the Board was that no extensive publicity should be directed to the general public until the mark could be seen in substantial numbers in the shops. Thereafter, a substantial publicity effort is envisaged, but it will be the concern not of BEAB but of the organisations represented on the board of management. A publicity committee has been formed, comprising representatives of BEAMA, BSI, EDA, EWF and ECA. This will swing into operation only when the initial task of informing manufacturers of the objects of BEAB has been completed. Thereafter, all the publicity facilities represented around the Board table will be used.

Path to Success

In the early days of BEAB, manufacturing industry has adopted something of a "wait and see" attitude, and applications for approval have extended little if at all beyond what would have been submitted for EDA test-house approval. It is hoped by the BEAB management board that once the mark is before the public, manufacturers will become convinced that its value as an aid to selling is well worth the £70 or so it will cost to obtain.

Indirectly, an important gain to manufacturers that is likely to result from successful establishment of BEAB is eased export selling. An active British test and approval organisation will be able to negotiate on near-equal terms with administrations in other countries, where safety testing is a statutory requirement. The cross-licensing of approval that may be hoped for as a result could be a valuable factor in facilitating overseas trade in domestic appliances.

Readers Views

Correspondents writing under pseudonyms are asked to submit their names and addresses in confidence to the Editor

Safe Terminations for H.V. Motors

IN Readers' Views, ELECTRICAL TIMES, 16 February, mention is made of likelihood of condensation in h.v. motor terminal boxes. A short while ago I had the opportunity of seeing the damage resulting from internal pressure under fault conditions on one of these boxes. Casually looking at motors which were running on load, it was noticed that the temperature of the terminal boxes was considerably lower than that of the motor casings. Further inspection showed that there was a non-metallic gasket between each terminal box and the motor casing. I may be entirely wrong in my assumption but would not a metallic gasket, say of copper, be far superior to the non-metallic gasket as it would, by conduction, allow the temperature of the terminal box to approach that of the motor casing, and so tend to minimise condensation trouble in the terminal box? An alternative and, to my mind, a much better method would be to line the inside of the terminal box and lid with a thermal insulant.

Perhaps your readers would be kind enough to enlighten me on this possibility.

E. A. Robbins,
WORKSOP, NOTTS.

Ring Circuits

I WISH to refer to the section on ring-circuits in *Megohm's* "Notes on Wiring" in the 9 February issue. While I agree with its technical points I cannot accept the implication in the statement "more evidence is coming to hand every day which shows that the amateur wireman has been getting information on ring-circuits from certain periodicals."

I do know that journals to which he apparently refers receive very many letters from readers on ring-circuits and other electrical matters and they are answered by electrical experts of whom *Megohm* no doubt approves. Many answers emphasise *Don't*, but where relevant, the letters meticulously explain the correct way of inserting socket-outlets and the importance of checking whether the specific cable is the ring or spur.

Many articles I have read in the home journals are correct, having been written by experts and checked by other experts respected in the industry.

Handymen will tamper with their installations whether encouraged or not and I would suggest that home journals are doing a service in explaining the correct way. The letters and the answers in the files of the journals would, I am sure, be an eye-opener for many of those who criticise them sometimes.

All I would add is that since amateurs will handle electrical work, and there is no law yet to stop them, let us make sure that they do it correctly.

Socket-Outlet

* * *

MEGOHM'S remarks on amateur wiremen in his 9 February notes recall to me an electrical specification which I read three or four years ago, issued by a city council in connection with their housing programme.

The specification stated that the 13 A outlets scheduled should be on a ring main circuit or, alternatively, they could be wired to outlets on a 7/·029 circuit protected by a fuse not exceeding 20 A, which, of course, complies with IEE Regulations.

I was amazed, however, when I read that one of the two outlets on the 20 A circuit could be the immersion heater. In such an installation, when the immersion heater was switched on, it would be possible to have a load of up to 5 kW or 6 kW on the circuit dependent on the loading of any appliance which might be in use on the 13 A outlet connected to the circuit.

This must be regarded as extremely bad engineering practice coming from a city council, which could easily be taken advantage of by some contractors who wished to cut their price when tendering.

E. L. Owen,
SHREWSBURY.

Defeating the explosion hazard

ELECTRICAL PLANT OPERATION AT PETROLEUM DEPOTS

THE practice of "filling up" at a petrol station is so commonplace these days that one is inclined to dismiss the explosion hazard as negligible, despite the notices of "No smoking. Switch off lights. Stop engine.", all widely displayed and so frequently ignored. Only when a rare major fire at a refinery, depot or garage occurs and makes the headlines is the average person reminded that petroleum vapours are highly dangerous and to be treated with respect.

To a great extent, this attitude may be attributed to the careful manner in which the installations and their associated electrical equipment are designed, planned and installed. Engineers who have this task are under no illusion as to their responsibility and the problems involved. This is clearly evident in the paper* which was presented to a meeting of the ASEE in London last Tuesday by Mr W. F. J. Cocks, Head of the Electrical Section in the Engineering Department of Shell-Mex and BP Ltd.

From the earliest days of the present century, when mining, chemical and oil industries showed their desire to employ the convenient and clean electrical forms of power and lighting, engineers, chemists and physicists have been engaged upon the task of removing the explosion hazards inevitable when an electric spark and an inflammable vapour are likely to meet. Their efforts have resulted in a number of designs for the types of electrical appliance suitable for use in such locations and a series of regulations for their installation and operation. The paper deals, naturally, with the particular aspects of the petroleum installation.

All garages draw their supplies from petroleum depots, from which it is delivered by road transport, the depots drawing their supplies, in turn, from the major installations by tanker, barge, railcar or pipeline. The depots and major installations are located at points which are chosen by the companies to facilitate transport of the products. A depot has petroleum storage up to 5,000 tons, while the larger installations may have product storage, including petrol, diesel and fuel oils, up to 275,000 tons with an annual throughput of around a million tons. The electrical demand for a depot would normally be between 200 kVA and 500 kVA; that of the major installation could easily be 1,000 kVA.

Regulations

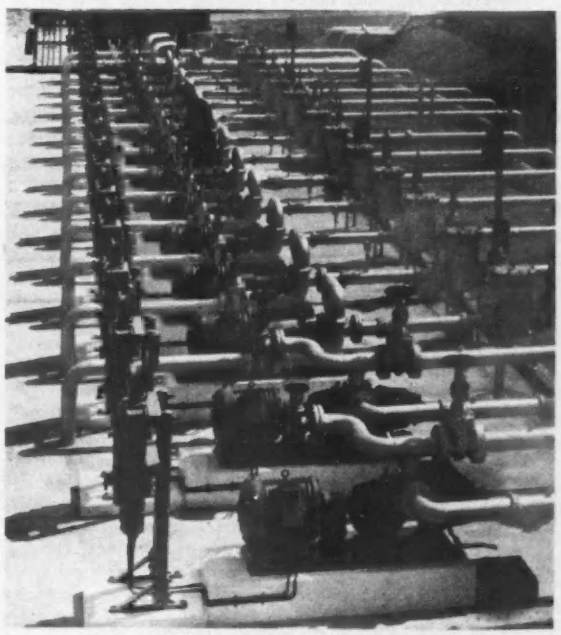
The regulations governing the use of electrical plant at petroleum depots include the relevant sections of Statutory Rules and Orders 1908, No. 1312, "Factory and Workshop Dangerous and Unhealthy Industries," the Petroleum Consolidation Act, 1928, and the codes of practice issued by the Institute of Petroleum and the British Standards Institution (C.P.1003), both of the latter being under constant review. The design of flameproof equipment for use in hazardous areas is controlled by BS 229, in which the flammable gases are divided into four groups, the last of which, covering hydrogen, acetylene, carbon disulphide, etc., necessitates the electrical equipment being sealed off in an enclosure pressurised to prevent the ingress of explosive gases or otherwise isolated from the area of hazard.

BS 1259 defines a term "intrinsically safe" as applying to electrical circuits in which the thermal energy released by sparking on breaking circuit or improper operation is insufficient to ignite the gaseous mixture. A great deal of research on the incendive properties of sparks has taken place since the Senghenydd colliery disaster in 1913, said to have been caused by a faulty bell circuit. These intrinsically safe circuits are widely applied in petroleum installations. Their main disadvantage is that they have a limited power availability which sometimes presents difficulty in extending control and indication circuits at a later date; otherwise they offer economic advantages over flameproof equipment.

All flameproof equipment has to undergo tests by the Safety in Mines Research Establishment before being certified as flameproof in accordance with the Standard.

Pumping Equipment

In a modern depot there are 18 to 20 centrifugal pumps for transferring the product from storage tank to road wagon at the filling gantries, each being driven by motors



A row of pumps with their associated flameproof motors and control gear at a petroleum depot

* "Operation of Electrical Plant in Hazardous Areas."

from 7½ h.p. to 30 h.p. according to the product, pipeline conditions and number of filling points served. In the major installation, motor pump units may range up to 200 h.p., depending on the pipeline lengths, suction conditions and type of product. The open form of station is desirable from safety aspects with, as a general rule, the motors and flameproof starters located well away from the filling points and controlled by flameproof push-buttons adjacent to the filling arms on the gantries.

Black oil pumps (fuel oils) have considerably larger motors on account of the higher viscosity and, though the products do not normally give rise to a dangerous atmosphere, they are frequently located in an enclosed pumphouse in a safe area of the installation.

At depots, one pump may feed more than one filling point, a situation which necessitates special protective arrangements to prevent operation of the pump from a point other than the one being served at the time without full knowledge of all concerned. Long pipelines to major installations may deliver different grades of fuel consecutively with a synthetic rubber ball or "pig" between the grades in the line.

Where the filling gantries are remote from the pumping area, the data and control multiplex system, intrinsically safe, offers an economic advantage over long mains-voltage control lines.

In the special case of hydrant refuelling lines for aircraft on aerodromes, the lines are often maintained with the fuel under pressure when not delivering to prevent ingress of moisture which could be an embarrassment to aircraft engine performance at high altitudes. This also necessitates special electrical control systems.

Remote Level Control

Another electrical function is that of indication of levels in remote storage tanks and a variety of methods have been developed, each of which has its own individual advantages. Some installations, involving long distances between tank and recording station, may use radio links for the transmission of information.

Heavy fuel oils may require heating in cold weather to reduce viscosity for pumping. Though the heating is usually effected by steam circulating in pipes in the tanks, the temperature of the contents must be monitored. This is done electrically. One method is to use a nylon tube, containing a high temperature coefficient nickel wire, wound in the form of a spring extending throughout the depth of the liquid as a sensing device to measure the average temperature, the wire being in one arm of a bridge circuit. Indication is provided by a galvanometer movement measuring out-of-balance current or by a null method in which the rebalancing adjustment in the opposing arm is automatically measured and calibrated in degrees C or F. The circuits are intrinsically safe.

Valve Control

Remote fuel valves in the pipeline are usually controlled by one of three methods, electro-pneumatically, motor- or solenoid-operated, the choice depending on pipeline conditions and size, product and economics of the type of controlling circuit. On tank inlet and outlet valves the electro-pneumatic type offers advantages, bearing in mind that large flameproof motorised assemblies are expensive.

Air supply for the valves could be obtained from a receiver in the tank compound, periodically charged from an air compressor installed for other purposes. Capacity of the receiver would be adequate for at least a day's operational requirements without recharging and a warning system would give notice of a fall in pressure below the minimum operational level through neglect or irregularity.

The Modern Installation

It is quite within the realms of possibility that the major installation of the future will be served by pipeline from the refinery with different grades of fuel being transported over the same lines. This will necessitate an extensive control, monitoring and metering network which will inevitably be electric in character. Operational staff within the receiving station will be advised by phone or radio from the refinery, maybe more than 100 miles away, that pumping of a special product has commenced. With a knowledge of pipeline capacity, pumping rate and characteristics, it is possible to estimate the time of arrival at the destination of the fuel or, if it is a change of fuels in the line, the time to switch valves at the receiving end.

Other electrical monitoring will be that of the specific gravity using an auto-gravitometer, pressure conditions, fuel temperatures, etc., all of which will be by intrinsically safe circuits. On arrival at the depot, the fuel in the pipeline is diverted to the particular storage tank by remotely operated, flameproof motorised valves, while indicating lamps on a mimic diagram give notice that fuel is flowing and the state of contents of the tank. Pumping will continue day and night, maintaining a constant flow and use of the pipeline, until the required quantity of the varying products is received. The presence of the separating device between fuels in the line will be automatically sensed and diverted as the valves change the destination of the contents of the line.

Alarm and indicating circuits warn of any abnormal conditions, such as products passing into the main drainage, flow of fuels into the wrong tank, etc. From the single, central position a small staff can regulate the entire distribution of a large system from the refinery, through major installations, to the distribution points. As a further step, much of the distribution could be programmed and automatically regulated by a punched card or tape-recorded system with provision for feeding back information to ensure that the instructions have been correctly carried out. At all points where electricity is the operating or regulating source the equipment would, naturally, have to be of flameproof type or intrinsically safe.

The DORIS Equipment

Associated with such a centralised control of distribution would be an ordering and accounting system for removing the paper-work and time delays inherent in present-day manual systems. Such a step in this direction has already been taken by the installation, last July, of DORIS, a Direct Order Recording and Invoicing System, at Royston, which can handle 3,000 customers' orders and, by the simple expedient of pressing the right buttons, the sales clerk can receive a telephoned order and telegraph the instructions well within half a minute. Thereafter, the machine issues the necessary order to the appropriate depot, prepares the sales ticket, calculates the value of the order and prepares the customer's invoice without further instruction or assistance. A permanent record for accountancy and statistical processes is also logged. The whole of the equipment, which has now been in full operation for over seven months, is mainly electromechanical rather than electronic, since speed of demand is well within the range of electromechanical devices. The introduction of DORIS heralds a new era of automation in the machinery of petroleum distribution and adds one more aspect of electrification to an industry which has long appreciated the advantages electricity can give.

NOTES ON WIRING

BY MEGOHM

I ARRIVED at my office one morning this week and found an *Electrician's Mate* lying on my desk. I must hasten to assure my readers that this was not one of the usual "mates" found on building sites, but a pocket-sized booklet available from one manufacturer of m.i.c.c. cables giving a comprehensive description of their m.i.c.c. cables, accessories, installation details and points to watch in special situations. A table gives details of fixing saddles, and there are many illustrations of the various accessories and ratings for all the available cables.

I have read this handy booklet with great interest and discussed it with several site foremen, who considered it a most useful "mate" to have on site. They agreed that it assisted in ordering material from site and, most of all, it could be kept in the pocket. I also assumed that their considerations were true from the obvious attempts by them to retain my copy of the book! I did say that it could slip easily into the pocket. It appeared to me that it could also be slipped easily *out* of the pocket!

A friend of mine who, I am glad to say, regards electricity as a good servant who should be treated with respect, showed me his latest purchase recently. Bearing in mind the possibility of having to climb into the roof-space or under his car, he had bought himself a transformer plug. This is a plug which is inserted into the normal house socket and has a transformer incorporated in the head, which serves a handlamp at 12 V, 25 V or 50 V as desired. The plug is well made and is available with either a 25 W or 40 W transformer, and a suitable inspection lamp complete with bulb is also available from the same firm. I understand that certain district councils specify these for use in their buildings.

I consider the plug to be soundly made and potentially of definite assistance in cutting down home accidents due to those home-made handlamps which we are always reading about. Such a lamp would be an asset in the garage, where one is inclined to find the handlamp core more easily damaged than when used inside the house. Perhaps, as the ordinary householder learns, we may see more of these units in use.

More Portable Lights

Yes, more portable lights, but of a different nature to the handlamp described above. A furniture exhibition would not appear to be the place to find a down-to-earth application of lighting. We normally see the usual type of lighting at such affairs, and it was pleasing to note a display of furniture which actually had the light source built into it. We are all aware of the use of fluorescent lighting behind curtain pelmets, but some of this furniture had 75 W internally silvered floodlamps fixed to the bottoms of tables and focused towards the centre of the room and made to emphasise textures of rugs, etc.

Of course, such an arrangement calls for expert planning and, in my opinion, a high degree of maintenance. Unfortunately, we have many "experts" who would arrange such lighting by themselves. I have already seen some attempts to light windows from behind pelmets, kitchen working benches from the undersides of wall-mounted cupboards, and the type of wiring and the installation of the fittings have left me with a cold feeling. I have seen cheap flexible cables held in position by means of a staples—and not always of the insulated type.

Don't think for one moment that I condemn these ideas in lighting. I feel that it is time we did experiment with lighting in the home and in doing so convinced the householder that, besides being necessary, good lighting is not expensive. But while we try to make our point, we must also point out the dangers of bad wiring and long flexible leads concealed below rugs and carpets. Of course, we shall still meet those people who consider the only way to light a room is to site a point in the centre of the room and have a table lamp near the fire for reading purposes.

M.C.B's

I was interested to learn that many contractors are now using m.c.b's on floor-warming installations. Besides the normal advantages, another has emerged as we gain more experience in this field. Quite often, there is a tendency if a fuse goes on an installation to blame the system for being inadequate—the blown fuse not being immediately obvious. By using m.c.b's the condition is far more readily noticed and, of course, can, in certain instances, be rectified by the user. I am afraid that I do not enjoy the luxury of such a heating system, but I can see the sense in having protection which can be attended to by the consumer in certain cases and which tells the consumer that he must call in the expert.

After-dinner Comments

I am sure that many eyebrows were raised at the ECA dinner when one of the speakers suggested that competitive tendering should be cut down because of its waste. I agree that competitive tendering is one of the most wasteful sources of overhead costs and have in the past aired my views on the matter. A great deal of money is expended in tendering and the cost of this must be met somewhere along the line. However, I doubt if the answer to this problem is that advocated by the speaker. It is all very well to suggest that large building concerns seek the right contractor for their work and continue to negotiate year after year with that firm for other work. Unless a firm is "in the know" it might never be asked to do work.

Another matter, not mentioned by the speaker but noted by me, is the increasing trend of building firms *which have no electrical departments* asking to tender for electrical work in buildings for which they have tendered for the building works. When I see this sort of thing happening, I immediately make a few inquiries in an attempt to find out to whom the work is going to be sub-let. I know that quite a number of electrical contractors are "tied up" with building contractors but still function independently. I also know that a number of electrical contractors will agree with my views on this.

To get back to competitive tendering, I feel that this should continue, but that some way of compensating the unsuccessful tenderers should be found. And, of course, that the business of "taking a price for the job" should cease forthwith.

GENERAL ELECTRIC CO.

Progress in Manufacture—1960

This 150 ft tower with a horn paraboloid aerial on top at the Coventry Telecommunications Laboratory is duplicated at Banbury

IN these days of severe international competition, it is not sufficient merely to repeat the same designs of equipment year after year; new ideas and developments must be pushed ahead and brought into production in parallel with normal manufacturing and sales activities. This aspect of trading has always been a strong point with the GEC and the review of activities in 1960 again highlights the development and research achievements and interests no less than its successes in production and salesmanship.

The Wembley Research Laboratories, because of their close proximity to the lamp works and their past contributions to developments in electric lamps and lighting, are often—and mistakenly—looked upon as concerned only with this aspect of industrial research. In fact, the interests of the technical groups centred there are as diverse as the company's wide industrial activities. Some of these groups have been responsible for important fundamental discoveries, while developments during the past year alone have covered such wide fields as microwave generators, amplifiers using semiconductor diodes, synthetic ruby and paramagnetic crystal elements, studies of distribution network topology, colour television, superconductivity of metals at very low temperatures, impermeable graphite and carbon dioxide:graphite systems in nuclear power reactors, thin magnetic films for computer applications, thermo-electric cooling and gas chromatography.

In the lighting field new phosphors for fluorescent tubes have been developed and, in the tungsten filament lamp, the effects of iodine in reducing filament evaporation have been investigated. There is hardly a single aspect of the company's varied range of activities, industrial or domestic, which, at some point or another, has not links with the central Research Laboratories though, of course, there are many other development centres located at the factories and these are being extended from year to year as circumstances demand.

Engineering Group

Both at Erith and Witton, production of heavy engineering equipment has been well maintained, with some interesting items completed and delivered and new contracts obtained. From Erith, a unit of more than usual interest was the large Dixie non-clog hammermill for the Adelaide Cement Co. of Australia. Driven by a 650 h.p., 600 r.p.m. GEC motor and with a capacity of 350 tons/hr, it will reduce limestone in pieces up to 48 in. down to under 1 in. in a single pass and is the largest hammermill ever to be built in Britain. It is now in commission and, we understand, giving excellent service.

During the year, other hammermills for limestone crushing were developed, including a range of Dyad double-rotor mills, in addition to a range of Sherwen vibrators, medium and fine Vibrex screens and the first jar-bar grizzley feeder for screening wet or clayey ores.

Also for the mineral industry, three side-discharge wagon tipplers, delivered to the South Durham Steel and Iron Co., with capacities of 50 tons coal and 60 tons ore, are among the largest now in use here and similar tipplers up to 100 tons capacity can be supplied in future.

Orders placed include a 500-ton reclaiming machine, a double wing stacker and transfer car for Bhojudih, India, and a £2 million contract for power plant at the Ravenscraig works of Colvilles Ltd. Associated Portland Cement Co. also placed a £75,000 contract for plant, which was delivered to Nigeria last summer.

At Witton, the main news was of large contracts placed for rolling mill drives and generators. A £2¼ million contract for a 63 in. hot strip mill at Llanwern Spencer works of Richard Thomas and Baldwin includes five 8,000 h.p. and one 7,000 h.p. motors and control equipment. From abroad, some £2 million of orders are represented by two 60 MW turbo-generators for Kelvin "B," Johannesburg, and two 15 MW pass-out turbo-generators for Ras Abu Aboud station, Qatar.

In the nuclear energy field, progress has been made with the 300 MW Hunterston project, a GEC and Simon-Carves

A GEC 100 m.p.h., 25 kV electric locomotive setting out for the initial run on the Manchester-Crewe section, BR

Atomic Energy Group undertaking, while, on the other side of the world, sub-contractors are preparing the site for the Tokai-Mura 150 MW nuclear power station in Japan and GEC engineering and commercial staff are in discussion on design problems with the Japan Atomic Energy Authority. The scope of the company's activities in this field has been broadened during the year by the introduction of two research and training reactors, the "Consort I," with a power of 10 kW, and the 100 kW "Consort II."

Lighting and Heating Group

The output of this group has again been well maintained both at home and abroad. Perhaps the most interesting home event was the lighting of the Royalty theatre, the first new London theatre for nearly 30 years.

Three giant crystal and gold-plated chandeliers, 11 ft 6 in. high and 6 ft 6 in. diameter with 7,800 drops of crystal in each, are part of the order placed, on behalf of King Phumiphol and Queen Sirikit of Thailand for their palace, on the last day of their visit to Britain last year.

Lamp and tube production has been increased by improved and extended equipment at the Osram works, while the demand for special lamp bulbs from the Osram glass works also reached a new high level.

Radio and Telecommunications

Despite the recession in demand for domestic TV receivers towards the end of 1960, the company re-planned its TV receiver production lines during the year to accelerate the output rate of existing and new models while, on the sound radio side, transistorised models have been developed with improved outputs and capable of receiving the FM/VHF broadcasts. Re-entry into the radiogram market has been signalised by a stereophonic radiogram incorporating many advanced features and a most striking appearance.

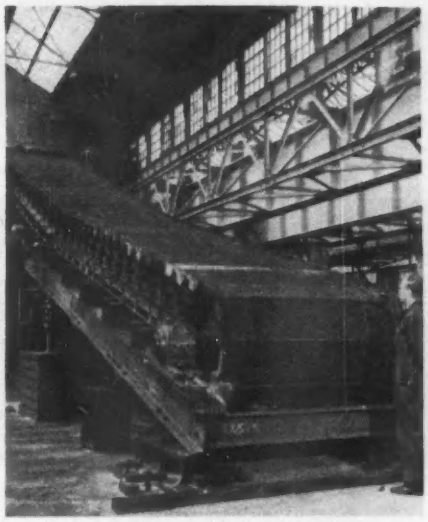
In the public-address field, installations of note include the travelator annunciating system at Bank station, London, one of the largest hospital installations at Dudley Road, Birmingham, and many others.

At Coventry, where a new telecommunications laboratory has been opened, a feature is a 150 ft steel tower surmounted by a horn paraboloid aerial which has been erected to provide testing and experimental microwave facilities in association with another similar tower near Banbury. A new microwave link has also been delivered to the Brunswick Telephone Co. and Maritime Telegraph and Telephone Co. for a telephony/television/standby radio connection between St. John, New Brunswick and Sydney, Nova Scotia. The link comprises eight terminal stations, 18 repeater stations and includes a 49-mile path over water.

Transport

The most important event in the transport group was the opening of the Manchester-Crewe 25 kV line, over which ten 100 m.p.h. GEC locomotives are now operating. An unhappy interlude was the trouble experienced with the new multiple-unit electric stock on the BR Eastern Region line from Liverpool Street, where some unexpected high-voltage surges were traced as the cause of premature breakdowns of insulation on the motors. As the year closed, this trouble had been surmounted and new equipment was being subjected to track testing.

A further order for multiple-unit electric train sets was received in October from the British Transport Commission. Valued at over £580,000, it covers the supply of 23 high-speed a.c. trains for inter-city services on the Eastern Region between Liverpool Street and Clacton/Walton-on-Sea.



A 72 in., 45 ft long pan feeder prior to dispatch to Western Nigeria

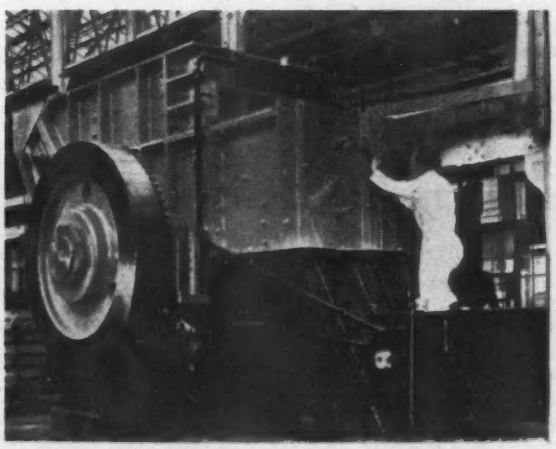
Marine Vessels

On the four largest passenger liners to be built in this country since the war, the *Empress of Canada, Windsor Castle, Oriana* and *Canberra*, GEC has a fair share of electrical equipment and a major share of the lighting installations. On the *Oriana*, there are some 14,000 fittings, covering 100 types, of GEC design and construction; on the *Windsor Castle* there is 3,500 ft of cold cathode lighting and over 2,000 tungsten filament fittings. The *Empress of Canada* and the *Canberra* will both have installations of GEC cold cathode lighting in the public rooms and a wide variety of tungsten filament lighting fittings.

Other Activities

A new £100,000 factory of the Simplex Dairy Equipment Co., a member of the GEC group, was opened last September and the Applied Electronics Division increased its laboratory facilities in Portsmouth, Stanmore and Salisbury, South Australia, the last being concerned with trials of guided weapons equipment at Woomera.

The semiconductor and domestic appliance divisions also reported increased sales and output, while the main news from Salford Electrical Instruments was of the first commercial thermo-electric cooling unit and thermo-electric hygrometer.



This 72 in. by 60 in. Dixie non-clog hammermill, the largest ever to be built in Britain, is for an Australian cement factory

Personalities *in the industry*

Mr J. M. C. Dukes

Mr V. W. Lowe

Mr D. J. Agnew

Mr D. Edmundson

Mr G. P. Thompson

The Plessey Co. Ltd. announce the appointment of **Mr J. M. C. Dukes,** M.A., D.I.C., A.M.I.E.E., as technical manager of the company's Telecommunications Division. Mr Dukes was for 12 years with Standard Telephones and Cables Ltd., where he became head of the STRAD electronic switching laboratory. He is also known for his contributions to microwave and communication theory and has written a book, "Printed Circuits —Their Design and Application." which is about to be published.

Chief engineer of Erskine, Heap and Co. Ltd., **Mr V. W. Lowe,** B.ENG., M.I.E.E., M.AMER.I.E.E., has been appointed a director of the company. Mr Lowe graduated at Liverpool University and then served his college apprenticeship with Ferguson Pailin Ltd. After some years as a research engineer with that company, he became senior electrical engineer at Dalton works, Dyestuffs Division, ICI. In 1949 he was appointed chief engineer, Switchgear Division, Brush Electrical Engineering Co. and in 1955 took up his present position as chief engineer of Erskine, Heap and Co. Ltd.

Mr Alexander McKellar, C.A., has joined the board of Bruce Peebles and Co. He is president of the Institute of Chartered Accountants of Scotland.

Mr F. H. S. Brown, C.B.E., B.SC., M.I.MECH.E., M.I.E.E., deputy chairman of the CEGB, has been elected a Fellow of the Royal Society of Arts.

Formerly managing director of CEA (Distribution) Ltd., of Leicester, **Mr H. Underwood,** M.I.EX., has joined Lec Refrigeration Ltd. as sales director. **Mr G. A. Farley,** at present in the Middle East to launch a new sales export campaign for Lec, has been promoted to export sales manager, and **Mr T. Earl** becomes sales supervisor for the Southern area of England, while **Mr W. Pickup,** previously sales representative in Lancashire, is now sales supervisor for Northern England and Scotland.

District engineer of the Thurrock district of the Eastern Electricity Board since 1958, **Mr D. J. Agnew,** A.M.I.E.E., has been promoted to district manager there in place of **Mr H. J. Unwin,** A.M.I.E.E., who has moved to the Board's headquarters at Wherstead. Colchester born, Mr Agnew received his technical training at the North Essex Technical College, at the Mid-Essex Technical College, and at the Rotherham College of Technology. He entered the electric supply industry in 1938 with a student apprenticeship with the Colchester Corporation Electricity Supply Department and on completion was appointed a junior engineer with the undertaking. Following service with the RNVR he was appointed assistant mains engineer with the Sheffield Corporation undertaking in 1947. Two years later he became third assistant engineer in the Sheffield sub-area of the Yorkshire Electricity Board, serving in turn in the distribution, design, construction, operation and maintenance sections. In 1956 he was appointed first assistant district engineer with the Merseyside and North Wales Electricity Board. Mr Agnew served for five years on No. 10 District Joint Board for the supply industry and is a past member of the National Executive Council of the EPEA.

Mr G. D. Toogood has been appointed sales manager of the Superheater Co. Ltd. He is a director of Heat Exchangers Ltd.

Newly elected chairman of the Small Switch and Fuse Gear Section of BEAMA is **Mr R. H. Scholes** (of George Scholes and Co. Ltd.), with **Mr H. G. Palfreman** (of Bill Switchgear Ltd.) as vice-chairman. In the BEAMA Accessories Section, **Mr J. A. C. Kendle** (of AEI Ltd.) has been elected chairman and **Mr B. W. Pickup** (of Falk, Stadelmann and Co. Ltd.) as vice-chairman.

Managing director of S. W. Bligh Ltd., **Mr A. Apps** has been elected vice-chairman of the Canterbury and District Chamber of Trade. A prominent ECA member, Mr Apps serves on several committees.

General manager of the Rugby works of Associated Electrical Industries Ltd. since Jan., 1960, **Mr D. Edmundson,** M.I.E.E., has been promoted to manufacturing manager, AEI Electronic Apparatus Division, in succession to the late Mr E. T. Barnes, and **Mr G. P. Thompson,** until recently manager, manufacturing, at Rugby, becomes manager, Rugby works. Mr Edmundson, a native of Gateshead upon Tyne, was educated at Saffron Walden and Rugby College of Technology and Arts (now Rugby College of Engineering Technology) and served an engineering apprenticeship with BTH. In 1934 he became a design engineer in A.C. Engineering Department, Rugby, and liaison engineer with Motor Department, Trafford Park, Manchester. In 1940 he was appointed head of the Electrical Laboratory, and in 1946 test engineer, Rugby works, eventually becoming superintendent, Test Department. In 1957, Mr Edmundson was appointed assistant manager manufacturing, being promoted manager, manufacturing, on 1 Jan., 1959. On behalf of the company he has visited USA, Switzerland, France and Germany. Mr Edmundson is a past-secretary and chairman of the Rugby sub-centre of the IEE and is the present chairman of the Engineering Advisory Committee, Rugby College of Engineering Technology. Mr Thompson's higher and technical education was at Battersea Polytechnic, and following a full-time day course he was awarded a first-class diploma with distinction in electrical engineering. He

joined BTH Rugby as a student apprentice in 1930, and at the end of his term was appointed to the staff of the Transformer Engineering Department. In 1934 he was appointed technical assistant to the superintendent of the Transformer factory. In 1949 Mr Thompson went to study transformer methods in France, and later at the Pittsfield factory of the GE Co., America. He was appointed chief assistant to the superintendent of the Transformer factory in 1950, and manager of that factory in Oct., 1953. He was appointed manager, manufacturing, at Rugby works in Jan., 1960.

A part-time member of the South Western Electricity Board since 1948, **Alderman S. H. Payne,** J.P., is mayor-elect for Taunton for 1960-61. This will be his second term in that office, which he held in 1945-46.

Mr M. R. Symonds, A.C.A., and **Mr R. H. Symonds,** whose appointments as directors of R. H. Symonds Ltd. we noted on 9 Feb., have also been appointed to the board of Symonds and Sons Ltd.

Appointed as area manager for Scotland for Atlas Lighting Ltd. is **Mr Arthur Rowlett,** who has been the firm's Scottish sales supervisor since November, 1959. He is also a member of the Council of the Scottish Committee of the Electrical Trades Commercial Travellers' Association.

Mr E. T. Muston has been appointed general superintendent, Rugby works, AEI (Rugby) Ltd. Since 1949 he has been superintendent of the Fabrication factory. He joined BTH in 1918 and after gaining experience in various departments throughout the Rugby works, served an apprenticeship as a toolmaker and designer. Mr Muston then left the service of the company, but after two and a half years with other engineering firms returned to the Rugby works in 1928. Following several years in the tool room drawing office he was promoted to the position of general foreman, Press Department, in 1936. He was transferred in 1940 to the company's Peterborough works as general foreman. This factory was then engaged on the manufacture of aircraft components but later was devoted to the production of domestic appliances. He became superintendent of the Peterborough works in July, 1945, but returned to Rugby in June, 1949, on being appointed superintendent of Fabrication factory.

The North Eastern and Yorkshire Region of the CEGB announce that the Transmission Construction sections and the Technical Departments of the North Eastern and Yorkshire Divisions are now to be combined and reorganised on a regional basis. **Mr W. J. A. Painter,** WH.SC., A.C.G.I., D.I.C., M.I.E.E., becomes regional electrical and transmission engineer and he will be assisted by **Mr J. H. Dance,** A.M.I.E.E., as regional transmission project engineer and **Mr F. H. Birch,** B.SC.(ENG.), M.I.E.E., D.F.H., as regional technical engineer. Mr Painter has been technical engineer to the Yorkshire Division and, prior to 1948, was for 15 years with the Central Electricity Board, latterly as senior assistant technical engineer in the Mid-East England area. He has been a member of the Electrical Engineering Committee of the Yorkshire Council for Further Education since 1949 and a member of the Board of Governors of Leeds College of Technology since 1957. Mr Dance, who has held his present position for seven years, was assistant engineer, Construction Section, of the North Eastern Electric Supply Co. prior to 1948. Mr Birch, at present technical engineer, North Eastern Division, was in the Technical and Research Department, South East England District, of the CEB from 1940 to 1948 and is joint author of IEE papers on "Protective Gear Management" and "Fault Throwing Tests on the 132 kV Grid System."

Director and general manager of W. T. Glover and Co. Ltd., **Mr J. H. Maxwell** will relinquish executive duties as general manager on his retirement on 30 June. **Mr E. P. G. Thornton,** now director and joint assistant general manager, will succeed him as general manager from that date and, meantime, has been appointed deputy general manager. In addition, **Mr W. R. Gibb,** at present director and joint assistant general manager, becomes assistant general manager, in which capacity he will deputise for Mr Thornton in his absence. Mr Maxwell joined the company as office boy in 1910 and, apart from war service with the RNVR, has served the company in positions of ever increasing responsibility over the past 51 years. During the course of his career he has held the posts of estimating manager, general sales manager and deputy general manager. He has also been closely connected with the activities of the Cable Makers' Association. Mr Thornton joined the company's outside contracting organisation in May, 1939, and was appointed a contract engineer in 1941. He was subsequently seconded to the works technical staff and became assistant chief engineer, Paper Cables Division, in January, 1943. He was appointed technical manager (mains cables) later in that year and in June, 1960, was made a director of the company with the executive responsibilities of joint assistant general manager. Mr Gibb joined Glover's as secretary in January, 1944. In February, 1955, he was made a director and financial manager and, last June, was appointed joint assistant general manager.

We are now able to reproduce, below, the portrait of **Mr W. H. Mills,** A.M.I.E.E., whose promotion as manager of the Rhondda district of the South Wales Electricity Board we reported last week.

Several new appointments are announced by the UKAEA to take effect from the reorganisation on 1 April next (see page 305). **Sir William Penney,** K.B.E., D.SC., F.R.S., at present Board member for Scientific Research, becomes deputy chairman of the Authority, with primary responsibility for scientific and technical co-ordination throughout the Authority. **Sir William Cook,** C.B., at present Member for Development and Engineering, will in future be known as Member for Reactors; and **Sir Leonard Owen,** C.B.E., M.I.MECH.E., M.I.C.E., will have the title Member for Production and Engineering, with responsibilities extending over the production and engineering groups. At the head of the five groups carrying out UKAEA operations will from 1 April be **Dr F. A. Vick,** O.B.E., PH.D., director of the research group (and director of AERA, Harwell); **Mr R. V. Moore,** G.C., B.SC.(ENG.), managing director, reactor group; **Mr J. B. W. Cunningham,** M.I.MECH.E., managing director, engineering group; and **Mr J. C. C. Stewart,** C.B.E., F.INST.P., managing director, production group. Dr

Mr A. Rowlett

Mr E. T. Muston

Mr W. J. A. Painter

Mr W. H. Mills

Vick, who is 49, was educated at Birmingham University, and joined the UKAEA in 1959 after being professor of physics and vice-principal at the University of North Staffordshire. He is a member of several Government advisory committees. Mr Moore, aged 44, graduated at London University and was apprenticed to the County of London Electrical Supply Co. He served in the Royal Navy and was awarded the G.C. for mine disposal work. In 1946 he was one of the first engineers to join the Harwell staff and worked as a group leader on the construction of BEPO and, later, in the design studies on Calder Hall. Since then his advancement in the UKAEA has been rapid. He has been deputy managing director, projects, in the development and engineering group since October last. Mr Cunningham is 49 and became associated with the Ministry of Supply Atomic Energy Department in 1947; Mr Steward, aged 44, was concerned with radar development during the war and afterwards became one of the early members of the Harwell team, later becoming concerned with UKAEA commercial and production activities.

Secretary of BEAMA since 1952, **Mr J. Oldroyd,** T.D., M.A., F.C.I.S., has been appointed general manager of the Lead Development Association and will take up his new duties at the beginning of April.

Mr R. L. Bassett has been appointed a director of Associated Electrical Industries and has resigned from the board of AEI (Woolwich) Ltd.

Mr Ivor Williams, market development manager of the GEC's Lighting and Heating Group, is now on a four-week sales tour and market survey of the West Indies and American Middle West.

Changes in their organisation are announced by Thermodare (Gt. Britain) Ltd. While **Mr C. J. Wheeler** remains technical manager, and **Mr R. J. Francis** in control of the Infra-Red Division, the following appointments take effect on 1 March: **Mr R. F. Day** to be sales manager of the Floor Heating Division; **Mr G. W. Clarke** becomes sales manager of the Block Storage Division; and **Mr P. J. Ewen** is to be London manager. In the provinces, **Mr K. S. Reeves** is appointed technical representative for the North West and Merseyside areas.

OBITUARY

Mr Henry Ayton, M.I.MECH.E., formerly chairman of H. R. Ayton Ltd., of Belfast, died recently, aged 76. He went to Northern Ireland in 1913 on behalf of Keith Blackman Ltd. and, in 1919, set up his own organisation to represent various British engineering firms. He became interested in the problems of fuel and power and was responsible for many steam-driven generating plants throughout the country in the early 1920's and early 1930's. In 1935 he joined his cousin, Mr Mark Firth, in Richard Thomas and Co. as managing director of a new strip mill then building at Ebbw Vale. Mr Ayton returned to his interests in Ireland in 1942 and moved to semi-retirement in Dublin in 1950.

Mr A. D. Noble, manager of the Edinburgh branch of Berry's Electric Ltd., died on 14 Feb., aged 57. He served an electrical engineering apprenticeship and joined Berry's from Woods and Cairns Ltd. in August, 1945, as manager of the company's new branch in Edinburgh.

Mr D. P. Davis, manager of the Cirencester office of the Southern Electricity Board, has died, aged 64. It is regretted that we wrongly gave the name as Mr J. M. Murray last week.

NEW LITERATURE

Principles and Practice of Aircraft Electrical Engineering

by H. Zeffert, A.F.R.AE.S., ASSOCIATE I.E.E., MEM.A.I.E.E.

THERE can be few fields of electrical power utilisation which can rival the spectacular developments made in aircraft electrical systems during the post-war years. Some measure of this phenomenon may be judged from the electrical load of individual aircraft, which for British types, has increased from a maximum of 6 kW in 1945, to the 300 kVA region of today. The opening chapter of the book outlines progress which has been made, tracing forward from the early pioneer days of the industry. Chapters following describe aircraft installation practice in all its branches, from generation and distribution through to servo-control systems, instrumentation and telecommunications equipment. Attention is paid to individual components and wiring systems, with emphasis on absolute reliability required of such components under extreme environmental conditions. The text is illustrated with an abundance of commendable diagrams and drawings, including photographs of airborne equipment. The subject matter is presented with a distinctly practical flavour, strictly theoretical aspects of electrical design and circuitry having been left to standard textbooks. Although basic material for the book is mainly British in origin, there are frequent references to American practice. Published by George Newnes Ltd., 726 pages, 8¾ in. by 5½ in. Price 90s.

Translation from Russian for Scientists

by C. R. Buxton and H. S. Jackson

THERE can be no doubt that a knowledge of Russian is going to be of increasing importance to scientists and engineers in the next few years. Already a considerable amount of technical information, much of it original, is filtering through the iron curtain and the facilities for translation are all too limited. The authors of this book have, therefore, attempted to produce a "primer" on the Russian language with special emphasis on scientific terms.

To the student the first obstacle is to understand and recognise the Cyrillic alphabet comprising 33 symbols, two of which are soundless, and to be able to discriminate between those symbols which are common to our own, but have an entirely different sound. After that, the textbook follows the old familiar pattern of British books on languages by teaching the grammar first and then by building up small sentences.

From here the student rapidly proceeds to annotated texts and extracts from scientific books and papers on a wide range of subjects.

Perhaps the biggest drawback to the book is a lack of any indication on pronunciation. Can one learn a language without understanding how it sounds? It is, indeed, doubtful. As a textbook, in a class learning the language from a speaker, it will be useful; for others of an inquiring mind it is an interesting study. Published by Blackie and Son, 296 pages, 8½ in. by 5¼ in. Price 30s.

Electronic Equipment Reliability

by G. W. A. Dummer, M.B.E., M.I.E.E., SEN. MEM. I.R.E., *and N. Griffin,* A.M.BRIT.I.R.E.

DESPITE its general title, the subject matter of this book is based mainly on experience gained with electronic equipment for military and aircraft applications. Suffice it to say that the stringent specifications demanded for such equipment should be more than adequate in judging performance of individual components intended for more mundane industrial uses. In the opening chapter the reliability problem facing designers and users of electronic equipment is defined, with the backing of extracts from statistical records of component failures, compiled both in this country and the United States. Chapters following deal with the analysis of factors influencing failure, types of failure and components most likely to be affected. Of particular note are those sections describing test procedures and design criteria for maximum reliability and also the chapter on the application of statistical probability in predicting component failure. One indirect aspect of reliability which is investigated is that of "human engineering," or the design of equipment to afford maximum convenience to the operator. The present volume incorporates an extensive bibliography arranged in subject order. Published by Sir Isaac Pitman and Sons Ltd., 274 pages, 5½ in. by 8¼ in. Price 45s.

Depreciation —a supply industry approach

DISCUSSION AT I.E.E. MEETING

LAST week the Supply Section of the IEE strayed from its customary concern with technical details to consider the financial aspects of engineering design, in so far as they affect provision for depreciation of plant. A paper* was presented offering a general theory on depreciation of engineering plant, which the author claims meets criticisms of conventional methods.

There are two methods of providing for plant depreciation in common use. The author describes as the "classical method," provision by setting up a sinking fund into which equal annual payments are made. These payments are so calculated that, at the end of appointed period, the fund, plus accumulated compound interest, amounts to the original capital cost of the plant. The alternative method, the "straight-line method," involves making the annual provision for depreciation constant instead of the total annual charge, with the result that interest payments decrease uniformly to zero at the end of the depreciation period.

The criticisms which the general theory is intended to meet are those which allege that the classical method involves acceptance of a constant total annual charge, without account being taken of the way in which factors which affect depreciation operate. This arbitrary feature, Mr Rudd considers, has the effect of casting doubt on estimates of costs and economic lives of engineering projects, and of comparisons of alternative schemes. Although the straight-line method may be considered a little more realistic in this respect, the constant provision for depreciation which it accepts is arbitrary.

Mr Rudd's general theory involves considering the total annual cost of engineering plant as resolved into two components:

(a) The capital charge, which is defined as the sum of the interest payable in respect of the plant and the provision for depreciation.

(b) The current cost, which is defined as all other expenditure in respect of the plant.

Central point of the general theory is that the capital charge should be such as to make the total annual cost in every year no greater than the cost of the most economic alternative method of providing the same services. The theory clearly makes the economic life of an engineering plant the period after which it is more economical to replace it than to continue to use it; or, of

* No. 3366: "A General Theory of Depreciation of Engineering Plant," by D. Rudd, B.SC.(ENG.), A.M.I.E.E., A.M.I.MECH.E.

DISCUSSION

MR J. M. DRUMMOND (CEGB) thought there was no such thing as a precise measurement of depreciation over any one year. Experience showed that generating plant had an economic life of between 30 and 35 years because it could be used for peak purposes, when it would be time expired in the ordinary way. However, there was another element in depreciation, financial prudence. Allowing for possible development and obsolescence it was not financially prudent to assume that generating plant would last so long and this had led the CEGB to write off generating plant over 25 years. One advantage of this method was that it allowed the CEGB to make an accurate forecast for many years ahead of the depreciation provisions with which it would be faced, and for which it had to make provision.

PROF W. G. BICKLEY (Imperial College) recommended the method of thinking adopted by the author in his paper, but MR L. H. WELCH (LEB) said it would be difficult to see what benefit would be derived from adopting a variable method of capital charges. Today it was essential to be certain that plant was not scrapped before it need be.

MR D. J. BOLTON suggested that the author had failed to distinguish between two different things, depreciation and depreciation provision. The first was something that happened to assets, but the latter was concerned with books and finance and had to be arbitrary. Total depreciation was factual, but how it was sorted out between years was arbitrary, and the author's method was as arbitrary as any other. It had to stand or fall on the basis of convenience and Mr Bolton thought it fell.

A third method of depreciation was discussed in a written contribution by DR S. FILON. This was the declining balance method, where depreciation was computed as a percentage of current "book value." He thought the criticism made, that all conventional depreciation methods were arbitrary, was justified. However, the method advocated by the author still left the need for arbitrary decisions.

MR T. E. NORRIS (Merz and McLellan) also took the point that depreciation was essentially an arbitrary exercise. Granted this, he suggested that the obvious approach was to choose the simplest method, which accounted for the widespread use of straight-line depreciation.

MR C. J. O. GARRARD (GEC) thought that accounting subjects should be looked at from the engineering standpoint. He instanced the way in which arguments about main line electrification had turned on economic calculations, whereas, in the long run, electrification "would have paid this country handsomely . . . at any time during the last 54 years."

MR F. GRIFFITHS thought that the current value of plant should be considered in stating a level for depreciation, and PROF M. W. HUMPHREY DAVIES (Queen Mary College) suggested it would be a mistake to try to have a uniform method of depreciation for all problems. He disputed the general theory on which the author based his method, saying that in a public utility, the desire should be to supply service at minimum cost, and that this implied that the author worked from a false starting point.

DR H. D. FINHORN said that for engineers, the objective in trying to assess cost was to decide whether to install a new plant or to continue to run an existing plant. Any decision to shut down a plant should not be influenced by depreciation considerations.

course, the period of which the plant will no longer work or performance or service for which there is no demand. The latter circumstances are not considered in the paper, as they do not involve economic considerations.

Life of Plant

There are two primary factors which limit the economic life of an engineering plant, so defined. They are physical deterioration to the plant and the effect of technological advance in cheapening replacement plant. Secondary factors affecting the economic life are capital cost, the rate of interest and the load factor at which the plant operates. These are discussed in some detail in the paper, after which the author turns to the application of his general theory to an integrated industry, such as electricity supply. Within such an integrated industry possessing a more or less continuous investment programme, the general theory can be developed to enable total annual costs of plants providing that service to be compared with one another year by year. The author argues that the total capacity of the system can be divided into a number of equal capacity sections, arranged in order of decreasing annual output, and appropriate cost parameters derived. Such a table enables estimated costs of new projects to be assessed against the background of the whole industry. For example, working on figures for 1948-49, the author concludes that if obsolete plant is neglected (i.e., plant for which his theory shows replacement by other plant more economical) than the total annual cost of any station is related to its annual output by the empiral formula

$$C=H+KF$$

where C=total annual cost/kW
H=£3·5/kW
K=£0·00186(0·447d)/kWh
F=annual output, kWh/kW

From mathematical analysis the author considers it reasonable to argue that such a simple relationship will be found to persist in successive annual analyses, and that coefficients will vary only gradually from year to year. If this supposition is accepted, the rate of variation of the coefficients becomes a valid measure of the rate of technological advance in the industry. In this case the coefficients themselves can be forecast much in the same manner as peak demand and total annual output are forecast at present, and it is possible to carry out the computations necessary to assess the total annual cost relating to new plant.

In the second part of his paper, the author discusses the effect on depreciation provisions of variations in the value of money. Predicted variations can be incorporated in the programme of capital charges by relatively simple computation, but unpredictable variations cannot be handled in this way and may lead to cumulative discrepancies in the predicted capital charges and the charges actually made. These discrepancies would be obviated if the "real" rate of interest were specified.

Queensland Supply Plans

CONSIDERATION of the comprehensive survey of the transmission and generating facilities in Queensland, prepared by Merz and McLellan is being deferred until certain basic costs of coal and hydro power have been revised. A reliable assessment of the Roma natural deposits, now thought to be larger than was at first believed, may also influence the action to be taken on the report. If Roma is developed it will be the first natural gas undertaking used for electricity generation in Australia.

Some of the survey's recommendations have already been implemented. One of these is the 66 kV line between Bowen and Proserpine. Supply reorganisation in South Eastern Queensland is also a pressing need and the Government has authorised negotiations between the State Commission, the Southern Electric Authority and the Brisbane City Council. Early negotiation is necessary to permit development of an economic transmission system for the two authorities and also to effect savings in power station operation. Merz and McLellan estimated that by operating all the power stations in the two areas as a combined system, a saving this year of £50,000 per annum is possible and that by 1965 this will have increased to £170,000 annually. Combining the distribution systems, in addition to the main transmission lines, will also allow considerable savings. In Brisbane the system losses were estimated by consultants to cost £600,000 p.a.

In the State Electricity Commission of Queensland's report for the year ended 30 June, 1960, the Commissioner says that expenditure on electrical development was limited by the restrictions imposed on raising loans. Even so, during the year under review, over £10¼ million was spent on development but a substantial increase over the next ten years is considered essential.

For the year ended 30 June, 1959, total units generated or purchased rose to 2,092 million, an increase of 9·7% on the previous year. The total revenue also rose by 8·1% to £19·7 million. During the financial year 1959-60 the Commission raised loans to the full authorised value of £3·6 million and for the current year a loan of £1·65 million has already been raised.

Increasing Capacity

At June last year the installed capacity of the Commission's generating stations totalled 750 MW and a further 150 MW was on order. Further installations on the Barron River were begun and investigations into the development of the hydro-electric potential of the Herbert River and for thermal stations using coal from the coalfields at Collinsville were proceeding. At Brisbane City power house, foundation work was well advanced, for a further two 60 MW sets and a 30 MW set was also to be installed at the Southern Electric Authority's power station. All three sets are scheduled for commissioning next year. During the year, the Koombooloomba dam on the Tully River was completed in the north of Queensland. This permitted an increase in the firm generating capacity by providing additional water storage.

The State's distribution system was increased by 2,000 miles during the year under review, notably by the completion of a 66 kV line by the Townsville Regional Board to Collinsville. In the Southern Authority's region, the changeover from 5 kV to 11 kV primary distribution was completed and a start made on the conversion from 6·6 kV. In South Eastern Queensland a 110 kV double-circuit line is to be constructed from Moggill to the northern suburbs of Brisbane with a capacity of 90 MW per circuit. 700 miles of line were added during the year. The Dalby Electric Authority extended their use of single line primary distribution with earth return. This system is used for isolated farms and is now being generally applied as the most economic method for supplying limited power at long distances. The Dalby single line system was extended for 15 miles. In the Wide Bay-Burnett region, the single wire system was used for 130 miles out of the 327 miles added to the 11 kV system.

The report comments on improved standards of installation work found by their inspectorate and, although fatal accidents rose slightly, the total accidents over the year had fallen by 39 to 190.

Wiring regulations interpreted

OFFICIAL PRONOUNCEMENTS ON THIRTEENTH EDITION

FIVE broadly interesting inquiries relating to the thirteenth edition of the IEE Wiring Regulations are dealt with in the latest group of interpretations issued under the authority of the IEE Wiring Regulations Committee. Involved are regulations applying to general distribution arrangements, floor-warming control and heated underlays in bathrooms, transformer earthing, and external signs.

The question on distribution contrasts the detailed regulations that existed in the twelfth edition with the general requirements in the current edition. The interpretation now issued confirms that any of the methods for connecting the distribution fuseboard stated in Reg. 109 of the twelfth edition are still acceptable; but incidental requirements of the thirteenth edition have to be observed. In particular, Reg. 108 must be respected in terms of protection for cables used for connecting the distribution board by looping into the busbars of a second distribution board. Protection has to be appropriate for the smallest cable used in either of the boards.

Heating Queries

The query on floor-warming control concerns the possibility of connecting a number of floor-warming circuits to a distribution board and controlling them by one isolating switch. The interpretation offered draws attention to Reg. 7 and Reg. 116 A as well as the obviously applicable Reg. 314 B, and calls for the designer of an installation in every case to decide the placing of isolating switches so that they will provide an "effective means suitably placed for easy operation" for cutting off supply to systems. In some installations it may be possible to comply with these requirements by using a single isolating switch for a number of floor-heating final subcircuits. However, what has to be borne in mind is the possibility of such switches being available for ready operation by those in charge of the premises—or any part of the premises—particularly in an emergency.

Heated carpet underlays in bathrooms are mentioned in connection with Reg. 405. A number of difficult questions of definition arise, beginning with the question whether an underlay is a "fixed appliance." Previous definitions make it clear that unless it is permanently fixed to the floor, it becomes a portable appliance, and consequently is not permissible in a bathroom. However, if such an underlay were permanently fixed to the floor and connected to the supply by means of fixed wiring, Reg. 405 C would be complied with. It would then be necessary to consider construction and installation of the underlay in the light of Reg. 304 and Reg. 305, covering apparatus in damp situations, and Reg. 614 for general standards of construction.

The conclusion of the Wiring Regulations Committee is that many of the types of carpet underlay at present available would not comply with these regulations. Failure to comply with them is considered clearly to give rise to serious danger in a bathroom. However, no clearcut proscription of heated carpet underlays in bathrooms is pronounced.

Transformers

On the question whether transformer secondaries operating at extra-low voltage are exempt from earthing, a firmly negative answer is offered. A transformer having any winding operating at a voltage above extra-low voltage has to be regarded in its entirety as coming within the scope of Reg. 401, which requires the metalwork and one point of the secondary winding to be earthed in accordance with Reg. 402 D. Although wiring and equipment operating at voltages not exceeding 15 V are in general not required to satisfy the provision of the Regulations, such installations must be segregated from those operating at higher voltages. Any isolating transformer used has to be installed in accordance with the requirements of the Regulations.

The last of the interpretations in the present batch deals with "Danger High Voltage" notices for small transformers. The case in point concerns a number of small box-type signs, each containing a small transformer, intended to be hung on the outside walls of buildings about 10 ft above pavement level. The interpretation places the onus for a decision on the designer of the installation, who has to judge whether or not the fitting is "accessible to unauthorised persons." Height above ground is not in its opinion necessarily safe to make a fitting inaccessible. The designer should consider, for example, whether the fitting may be reached from a window and what steps may be carried out about clearing the fitting.

E.D.A. SALES CONFERENCE

NEXT Tuesday sees the opening of the Electrical Development Association's Annual Sales Conference, for the second year running being held at Harrogate. The conference is being accompanied by an exhibition, largely concerned with domestic appliances.

The conference programme is to be opened on Tuesday morning by Mr D. Irving, chairman of the EDA and of the London EB. His opening address will be followed by a statement on EDA activities, presented by the Association's director, Mr J. I. Bernard.

Papers scheduled for presentation to the conference will deal with presentation of merchandise in service centres, with the manufacturers' viewpoint on the future of domestic appliances, and with adequate wiring developments. There will also be papers on control of floor-warming in domestic premises, and on area boards' relationships with small industrial consumers.

Proceedings of the conference and the exhibition will be covered in our next two issues.

new products and appliances

Automatic lighting controller

A PHOTOELECTRIC type lighting controller, the "Elcontrol PSL2," comprises a photo-cell, amplifier and relays, self-contained and giving an output which can be fed to a contactor controlling any number of lights. In operation, a relay becomes energised when daylight reaches a certain predetermined level and effectively switches off the lights. To eliminate "hunting" caused by possible interference from the artificial lighting, the circuit incorporates a special differential control feature. Dimensions of the unit, which is suitable for 200 V to 250 V mains supply, are: 9¼ in. by 5¼ in. by 5 in. Price is £18. *Elcontrol Ltd., Wilbury Way, Hitchin, Herts.*

Miniature wire-wound resistors

LIGHTNESS, compactness and stability are among special features claimed for a new range of miniature precision wire-wound resistors. Resistance winding bobbins are made from mineral filled epoxy resin, the winding itself being resin encapsulated. Wire lead resistor connections are used anchored to resist damage to the end seal due to flexing of the lead. *Miniature Electronic Components Ltd., The Lye, St. John's, Woking, Surrey.*

New look prepayment timer

ATTRACTIVE styling is the main feature claimed for a recently introduced prepayment timer intended for the rental of TV and radio receivers and other domestic appliances. The timer is housed in a plastics-moulded case having dimensions 7½ in. by 5½ in. by 4½ in. and is said to have a large capacity coin box, taking six permutations of any two coins between 1d and 2s 6d. When the timer is not in use the dial and slot facia can be covered with top and bottom hinging doors. *Aron Meters Ltd., 72-82 Salisbury Rd, N.W.6.*

Bulkhead fitting range extended

THE "Lighterway" range of bulkhead fittings now covers 60 W and 100 W as well as 40 W models and the latter now have translucent plastics front covers. They have bakelite bases with bushed entry for cables and include b.c. lampholders and internal plated reflectors. The new 40 W model can also be supplied with red, yellow or green diffuser. Prices: 40 W 10s 6d or 11s 6d coloured; 60 W 9s 8d; 100 W 17s 8d. Wire guards on two latter models 4s extra. *Metway Electrical Industries, Metway Wks, Canning St, Brighton.*

Earth continuity connector

A CONNECTOR for providing temporary earth continuity for cable armouring or metallic sheathing during live jointing operations consists of a length of tinned copper braid having two nickel-plated claw fittings clamped near either end, leaving two free lengths of braid. The piece of braid between the fittings is insulated with transparent plastics sleeving. Connection to respective cable ends is made by passing each free length of braid round the armouring or sheath and through the claw fitting. The braid is then pulled up tight and secured by means of a clamping screw. The connector is also suitable for providing temporary electrical bonding between discontinuities in earthed metal pipes, structures and machinery. *The Hepworth Iron Co. Ltd., 116 Canbury Pk Rd, Kingston upon Thames.*

Trigger pulse generator

A PORTABLE trigger pulse generator recently announced is claimed to be the first of its kind using transistors and printed circuitry, enabling a considerable reduction in bulk and power consumption normally associated with such equipment. It provides free running or synchronised pulses having amplitudes continuously variable from 0-65 V, and having a p.r.f. range of 10 p.p.s. to 100 K.p.p.s. Output impedance is 500 ohms and a range of four pulse widths is available, covering 1 microsec to 1,000 microsec, with pulse rise times never more than 0·15 microsec, even with a capacitive load. The unit is available for either mains or battery power supplies. *Winston Electronics Ltd., Shepperton, Middx.*

New freezer and fridge

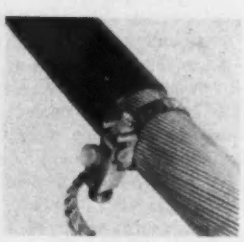
KENWOOD have produced a new table-top height domestic freezer together with a refrigerator of similar design. They are compressor type models and may be bought separately, but when installed together they are designed to fit side-by-side or on top of one another. A single table-top, covering both cabinets, is available as an optional extra. The refrigerator, HR52A, has 4·7 cu ft storage capacity and includes a large freezer compartment. The usual door-shelf storage space is provided to accommodate five pint milk bottles, four lager bottles 8¼ in. tall, eggs and other dairy produce. The freezer, HF42A, has 4·2 cu ft capacity. Food is stored in the door-space and in baskets within the main cabinet.

Dimensions of the cabinets are 2 ft wide by 2 ft deep by 36 in. high, with table top. Prices, including purchase tax, are: HR52A, £70 7s; HF42A, £76 13s. *Kenwood Manufacturing (Woking) Ltd., Woking, Surrey.*

H.V. stabilised supply

DESIGNED for use with electronic valves requiring operating voltages in the range 1 kV to 2·25 kV, the PP.4485 stabilised power supply is said to be particularly suitable for use with klystron oscillators. The unit provides for this purpose cavity, reflector and grid voltages and 6 V or 7 V a.c. heater supplies. Four built-in meters indicate supply voltages and current. *Research and Control Instruments Ltd., Instrument Hse, King's Cross Rd, W.C.1.*

◀ *Aron Meters prepayment timer for domestic appliances rental has neat moulded plastics housing*



Earth continuity connector manufactured by the Hepworth Iron Co.

Freezer and refrigerator units by Kenwood shown side by side can be bought separately if required

New wall-mounted fitting with 36 in. boom having wide horizontal and vertical movement

Swinging-arm wall light

A WALL light with a swinging arm, the 120 Swinglite, is among a new range of fittings. Using the balance weight principle, the light may be moved either horizontally or vertically to any position, has sensitive control and once moved remains static. The 36 in. boom with cone shaped shade is connected to the balance weight by two cords. Both boom and wall plate are eggshell enamelled in white or black and there is a wide choice of colour for the shades. The cost, including tax, is £7 15s. *Cone Fittings Ltd., Rosemont Rd, N.W.3.*

Lowest-priced dishwasher

AT £61 19s the lowest-priced electric dishwashing machine, the "Dishmaid," just introduced by Electrolux Ltd., incorporates several new ideas. Of circular design with a sliding door to permit loading, it has an interior wire cradle gently rotated at 6 r.p.m. while the crockery is bombarded by jets of hot water from three directions. One 75 W split-phase motor mounted at the top of the central spindle rotates the cradle and also drives the water pump.

Connection is made by rubber hose to an external hot-water supply and after a preliminary swilling away of the worst of the meal's debris, another seven pints of hot water is taken into the machine to complete washing in about four minutes. After a final rinse the dishes may be left to dry in the plastics-covered wire cradle.

If the loading door is accidentally opened while the machine is in operation an automatic cut-out switches off the motor. This arrangement also permits the addition of forgotten items without restarting the complete cycle of operations.

Claimed to deal with all dishes from a complete meal for four or five people, the machine can be placed on a draining board or working top at either side of a sink, or mounted on a wall bracket (35s extra) as our picture shows.

Measuring 21¼ in. high by 21 7/16 in. dia, its unloaded weight is 40 lb. Constructed of aluminium, it has a white glass stove enamel finish, with loading door in primrose yellow, is for use on a.c. only and carries a 12-month guarantee. Deliveries will start in May in the south of England. *Electrolux Ltd., 153 Regent St, W.1.*

Miniature thermocouple wires

THE range of "Thermocoax" miniature stainless steel sheathed thermocouple wires has been extended to include even smaller diameters, it is announced. The two new diameters are 0·34 mm. and 0·25 mm. and can be supplied in lengths of up to 6 metres. *Research and Control Instruments Ltd., 207 King's Cross Rd, W.C.1.*

Flat-element heating tapes

SOMETHING new in the concept of electrical heating elements is the "Hotfoil" range of insulated flat element tapes now available. Each tape consists of six parallel strips of corrugated resistance foil, laid up in flat formation and insulated with either polyester plastics material or woven fibreglass, depending on the maximum working temperature required. The tapes, having a standard width of 1 in., are robust and flexible and can be wrapped round pipes and vessels, the flat surface of the tape giving excellent thermal contact with a consequent low heat transfer temperature gradient. Among many applications are heating pipes in chemical works and oil refineries to ease the flow of viscous fluids, or making up heat losses and providing anti-frost protection for cold steam mains or water pipes. Another use is the heating of vessels containing corrosive liquids in place of the usual industrial immersion heater. The glass-fibre insulated tapes, which have a maximum working temperature of 450°C, can be supplied sewn together in the form of heating mats. The plastics-insulated grade have a working temperature of 110°C and are available with an adhesive backing to ensure intimate contact when the tape is used for heating irregularly shaped objects. Standard voltage rating is 230 V to 250 V for all grades. *The MEI Ltd., Cyprus Wks, Upper Villiers St, Wolverhampton.*

Krypton lamps

KRYPTON gas-filled tungsten lamps being imported from Hungary are claimed to operate at 15% higher efficiency than the argon-filled type. They are produced in candle and ball type opal models of 25 W and 40 W, with b.c. or e.s. caps. The glass envelopes are smaller than equivalent lamps of British manufacture and life claimed is 1,000 hr. Prices, tax paid, are as follows:

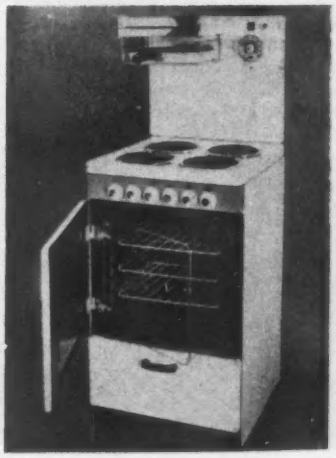
40 W candle	4s 1½d
25 W candle	3s 6d
40 W ball	3s 2½d
25 W ball	2s 11d

Sole U.K. distributors: *Hall Electric, Haltron Hse, Anglers La, N.W.5.*

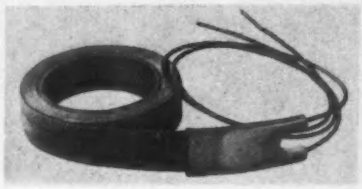
Extra plate on GEC cooker

THE low-priced cooker, "Treasure," which was introduced last year (see ELECTRICAL TIMES, "For the Electrical Trade," 13 Oct., 1960) is now available in a four-plate version at £59 10s. Costing only £7 10s more than the original timer model, the new "Treasure" retains all the other features. There is an eye-level grill with three-heat control, a separately heated warming drawer, inner glass oven door and a timer mounted on the splash plate for automatic oven control. The four 7 in. "Superspeed" hotplates each have 2,100 W loading and are recessed in the hob. Automatic interior lighting in the oven adds a touch of luxury to this very reasonably priced cooker. *General Electric Co., Magnet Hse, Kingsway, W.C.2.*

The "Dishmaid" will deal with all dirty dishes from a main meal for four or five people



Low-priced "Treasure" cooker by GEC has four "Superspeed" hotplates and incorporates many luxuries



"Hotfoil" flat element heating tape

Shaver price cuts

SELLING prices of all Remington 657 shavers are reduced by £2 on 1 June. This cut makes the price of £7 5s for the Standard model the lowest at which the company has ever offered a shaver. Dealers are given the advantage of the price cuts immediately though they are requested to maintain the old prices until 31 May. The new prices are as follows: Standard, £7 5s; Triple Volt, £7 19s 6d; Auto-Home, £8 15s. *Remington Rand Ltd., 26-40 Kensington High St, W.8.*

Potted current transformers

A RANGE of current transformers recently announced for both single- and three-phase working are completely protected from mechanical damage and moisture by potting in resin. They are of the ring pattern but have compact rectangular external dimensions. Three sizes of transformer are available covering primary current ratings from 100 A to 2,000 A, with standard secondary current outputs of either 5·1 A or 0·5 A. Toroid inside diameters can be either 1¼ in., 2¼ in., or 3 in. and primary busbar inserts can be supplied if required. The transformers are insulated for 660 V maximum. *Smith and Hobson Ltd., Hersham Trading Estate, Walton-on-Thames, Surrey.*

Ceiling heating range

EASE of installation is claimed as an outstanding quality of a ceiling-heating scheme being marketed by Triplan Thermal Acoustics Ltd. The basic system used involves laying special heating cables between joists, above ½ in. plasterboard ceilings, with mineral-wool installation directly above. The heating cables are made-up on site, using specially designed flexible formers. It is claimed by the manufacturers that existing occupied bungalows can be equipped with ceiling heating on this system in about two days, without constructional work. Low temperatures are said to be involved, the surface temperature being only 94°F to 97°F. Cost is estimated at 4s/sq ft of ceiling area, excluding control gear and mains wiring. *Triplan Thermal Acoustics Ltd., Cromford Hse, Cromford Court, Manchester 4.*

Tachometer tester

RECENTLY announced is a device for calibrating various commercial types of tachometer. Its operation is based on the stroboscopic principle and it uses a transistorised tuning-fork oscillator to provide a stable frequency standard. It is said to have been accepted by the RN and RAF as a standard test instrument. *Bryans Aeroquipment Ltd., 1 and 15 Willow La, Mitcham, Surrey.*

Improved m.s. welding electrode

NEGLIGIBLE spatter and excellent deslagging properties are among advantages claimed for a new mild steel welding electrode, the "Gazelle." Other features are high speeds of travel and the production of longer runs of weld/electrode than hitherto possible by electrodes in the same class. The electrode is of the "non iron-powder" contact type and is said to give satisfactory operation over a wide range of welding current, thus helping to ensure high quality welds. "Gazelle" electrodes are approved by Lloyds and the Ministry of Transport. *AEI (Manchester) Ltd., Transformer Division, Manchester 17.*

INDUSTRIAL AIR TREATMENT

TWO conditions causing problems in industry are airborne dust and humidity. Maintenance of dust-free air is of particular importance in the assembly of precision equipment sensitive to dust contamination such as parts of miniature servo-motors. Where components are small, as in the case mentioned, the establishment of special dust-free rooms or factory bays would be uneconomic. As an alternative, Plannair Ltd., have introduced an assembly cabinet, having a transparent top, through which filtered air is drawn by means of an extraction fan. An operator can carry out assembly inside the enclosure by inserting his hands through the door, the workpiece being illuminated by an internal light which switches on automatically when the door is opened. The height of the working plane is adjustable to suit the operator who is also provided with an adjustable foot rest.

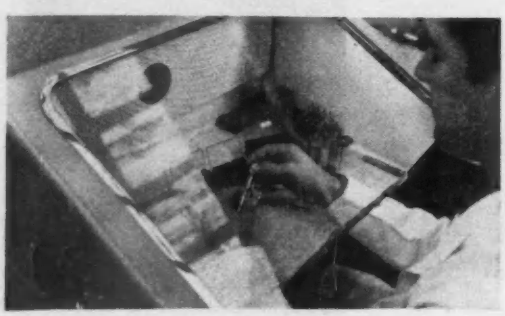
Dust created by grinding and crushing of materials or minerals such as carried out in cement manufacture and the quarrying and mining industry, presents a different problem. The dust not only contaminates surrounding areas and endangers the health of workers, but can also represent a loss of otherwise saleable material. A solution is the use of dust extraction equipment such as the h.v. electrostatic precipitator designed and installed by Simon Engineering for use with limestone crushing and processing plant. The precipitator, which is in two parts, performs the dual functions of collecting dust from crushers, conveyors and screens and of cleaning exhaust gases produced by two pitch-creosote fired limestone dryers. This is achieved by means of specially arranged precipitating electrodes, claimed to give an efficiency exceeding 99% with a power consumption of approximately 0·17 kW/1,000 cu ft/min cleaned gas flow. Capital cost of the plant works out at about £500/1,000 cu ft/min.

While the presence of dust usually connotes dryness, excessive atmospheric humidity produces the opposite effect and can cause extensive damage in places like stores and warehouses by promoting mould growth and corrosion due to condensation. To combat the problem, British Sarozal Ltd. have introduced a range of portable dehumidifiers whose operation is based on the air cooling principle. Known as "Hygro-Robots," each of these is a self-contained unit made up of a motorised compressor, evaporator and circulating fan. The standard model can maintain a relative humidity of 40% in rooms having a volume of up to 52,500 cu ft for air temperatures ranging from 12°C to 30°C, air circulation being at the rate of 28,700 cu ft/hr. Other models, incorporating automatic defrosting, are available for lower temperatures where dew-point occurs below the freezing point of water. Hygrostats can be fitted, if required, for constant humidity control. The latest "Hygro-Robot" models to be introduced have a larger air handling capacity, suitable for rooms up to 105,000 cu ft, and there is a special version which can maintain a relative humidity of 30%.

Plannair Ltd., Windfield Hse, Epsom Rd, Leatherhead, Surrey.

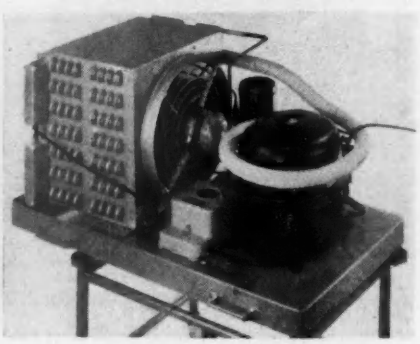
Simon Engineering Ltd., Cheadle Heath, Stockport, Cheshire.

British Sarozal Ltd., 22 Berners St, W.1.



"Hygro-Robot" dehumidifier keeps warehouses free from dampness ▶

◀ Operator assembling parts of motor tachogenerator inside Plannair dust-free cabinet



SPHERE GAP CALIBRATION

CALIBRATIONS of sphere gaps used in high voltage was the subject of an IEE lecture on Tuesday. The lecturer was Dr E. Kuffel, M.SC., PH.D., A.INST.P., and the lecture was supported by three papers on associated subjects.

Direct breakdown voltages of gaps between 2·0, 6·25, 12·5 and 25 cm diameter spheres were measured in the tests which provided the basis for the lecture and papers. Various factors which influenced the breakdown values have been studied systematically, including irradiation, the air humidity, the presence of nearby earthed objects, the polarity of the applied voltage and, to a certain extent, the material of the electrodes.

Irradiation from 0·5 mg of radium lowered the direct breakdown voltage of sphere gaps by as much as 4% in some circumstances. Increases of up to 4·5% in the breakdown voltage were observed when the humidity of the air was changed from 0 to 17 mm Hg vapour pressure of water. The influences of irradiation and humidity varied with the gap length, both factors having maximum effect at a particular spacing which depended on the sphere diameter.

The presence of a nearby earthed plane or an enclosing cylinder lowered the breakdown voltage of the sphere gaps by several per cent. The change in the voltage was related to gap length (expressed in sphere diameters S/D) and a clearance factor A or B (also expressed in sphere diameter A/D or B/D), where B is the radial clearance from the sparking point of the high-voltage electrode to the side of the cylinder and A is the corresponding distance to the earthed plane.

The effect of polarity and of the electrode material on the direct voltage breakdown was very small, and for gap lengths up to sphere diameter it did not exceed 1%.

Titles and references of the supporting papers mentioned above are as follows:

The direct-voltage calibration of air-gaps in a uniform field and between spheres up to 25 cm in diameter, by E. Kuffel, Paper No. 3372.

Influence of humidity on the breakdown voltage of sphere gaps and uniform field gaps, by E. Kuffel, Paper No. 3322.

The influence of nearby earthed objects and of the polarity of the voltage on the direct-voltage breakdown of horizontal sphere-gaps, by E. Kuffel and A. S. Husbands, B.SC.(ENG)., M.I.E.E. Paper No. 3371.

Both Dr Kuffel and Mr Husbands were with the Research Department, AEI (Manchester) Ltd.; Dr Kuffel is now at the Manchester College of Science and Technology.

Calibration Recommendations

Paper No. 3372 concludes with recommendations for the calibration of gaps. These apply for measurement accuracies of ±1%, for spacing between spheres extending to a distance equal to the sphere radius.

In the recommendations, additional irradiation is called for only for gaps shorter than 0·5 cm. It is suggested that atmospheric humidity should be measured and breakdown values reduced to a standard humidity and that calibrations should be made with standard conditions of proximity of earthed metal. Within the limits of accuracy considered direct breakdown voltage should be reckoned independent of the material of the electrodes and the polarity of the applied voltage. However, electrode surface should be smooth and free from dirt or grease.

In measurements made after calibration, it may be permissible to relax conditions for proximity of earthed metal, depending on the accuracy required.

Progress in nuclear stations

FIVE of the eight steam raising unit shells associated with the first reactor at Hunterston nuclear power station have now been raised on their plinths. Positioning of these 73 ft high, 19 ft diameter pressure vessels marks the most evident progress at the station in recent months. Together with other advances, it makes possible a scheduled criticality date for reactor A of August 1962 and for Reactor B, May 1963.

With the s.r.u. shells in position start has been made on installation of gas circulators and steam tubing in them. To facilitate this, a "clean conditions" building has been erected on the top of two of the shells.

Much of the structural steelwork associated with the s.r.u.'s has been erected, permitting steam drums and associated pipe work to be placed in position.

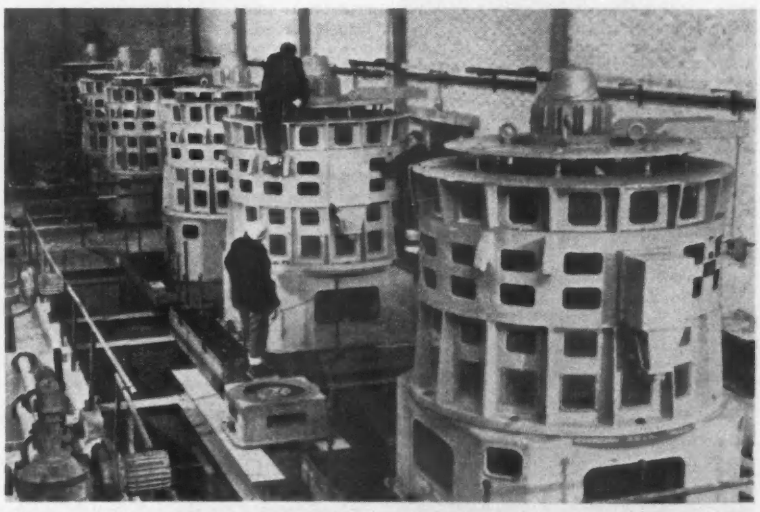
Reactor A pressure vessel is being prepared for stress relieving, which involves lagging with 6 in. thick thermal insulation. Reactor B reached a significant stage of construction with last month's lifting into position of the 340 ton support grid on which the graphite core will eventually be carried.

In the turbine hall which will eventually house six 60 MW turbo generators, a start has been made on erection of the first set. At the circulating water intake works about a quarter of a mile from the reactors the six c.w. pumps with 800 h.p. driving motors have now been installed and aligned.

Although the Hunterston station will use charge and discharge machines operating from below the reactor, there will also be "service" machines and cranes mounted above the biological shield of each reactor, and dealing with control rods and similar devices. Erection of the first of these machines is starting and testing of the control rod recovery and handling mechanism inside the first machine is in hand at GEC Erith Works.

Hinkley Point Tests

At the Hinkley Point station, being built by the E E-B & W-TW Atomic Power Group, an important point has been passed with successful pressure testing of the No. 1 reactor pressure vessel. This involved subjecting the 310 lb/sq in. To carry out the test, over 67 ft diameter sphere to a pressure of 3¼ million cu ft of free air was pumped into the vessel. The first reactor at Hinkley Point is scheduled for operation in 1962.



Heavy circulating water demand distinguishes nuclear power stations. There are six 800 h.p. pumps in the Hunterston intake works

News of the Week

Squeeze on boiler industry

Foster Wheeler link with John Brown

REFLECTING the acknowledged excessive capacity in the steam-boiler industry, Foster Wheeler Ltd. and John Brown Land Boilers Ltd. have formed a consortium to be known as Foster Wheeler John Brown Land Boiler Consortium. This organisation will carry on as a joint venture the business of tendering for and executing contracts for power-station boilers in the UK and Eire. Foster Wheeler Ltd., now with a £1 million capital, was originally formed in 1920 as Power Specialty Co., the name being changed to the present title in 1928. It is the UK manufacturing subsidiary of Foster Wheeler Corpn., of New York.

John Brown Land Boilers is a subsidiary of the shipbuilding and engineering firm John Brown and Co. Ltd. It was formed early in 1950 to make power station boilers at a time when there was insufficient manufacturing capacity to meet the (then) considerable orders for such work. Arrangements were made to use the designs and engineering information of Mitchell Engineering Ltd. Only a few months ago, Lord Aberconway, chairman, pointed out that the future of John Brown Land Boilers was "far from assured." In fact, the 1959 boiler order for Bankside was the only order the subsidiary had received from a British generating authority for over four years. He also referred to a "dearth of inquiries, intense competition for orders at unremunerative prices and worsening prospects of profit."

A little earlier, Sir Kenneth Hague, chairman of Babcock and Wilcox Ltd., had also spoken of the fierce competition, crippling low profit margins and unhappy labour situation in the boiler industry; and Mr G. R. T. Young, chairman of International Combustion (Holdings), has also referred to the sharp reduction over the past four years in the number of orders available to an industry with a capacity greatly in excess of current demand.

TAKE-OVER NEWS

THE Birmingham firm of Arco Rewinds, specialists in electrical motor rewinds, have acquired the electrical repair business of Grooms (Gt. Britain) Ltd., of Nottingham, which was established in 1892. The other interests of Grooms are unaffected by the deal. The latter's staff are being retained by Arco and extra employees recruited. Next month Arco Rewinds are opening a London office and service depot at 59 The Broadway, Stratford, E.15.

THE proposed acquisition of 51% of the share capital of the Tieghi Co., of Milan and Leuno, by George Kent Ltd. has now been effected. A new company, Kent-Tieghi S.p.a., which has been formed has purchased all the assets and goodwill of the Italian concern.

E. K. COLE LTD. have acquired a controlling interest in V. C. Bond and Sons Ltd., suppliers of cabinets for Ekco radio and TV receivers. E. K. Cole already had a minority holding in the company.

JOHN Thompson Industrial Constructions Ltd. ("Induscon") have taken over the administration of the John Thompson Conveyor Co. Ltd. This is purely an administrative change under which Mr A. T. Shaw, managing director of the first-named company, will now direct the activities of the Conveyor Co., whose manager, Mr R. T. McGregor, continues as sales engineer of "Induscon."

CHANGES OF NAME

THE name of Southern United Telephone Cables Ltd. has been changed to Telephone Cables Ltd.—a company jointly owned by AEI and Enfield Cables Ltd. Its directors are: Dr J. N. Aldington (chairman) and Messrs W. A. Ankerson, S. E. Goodall, A. F. Lampitt (managing director), A. T. C. Moore, M. J. Smith and J. E. Sunderland.

THE King Group of companies at Slough have formed a company with the title of Isora Illuminated Ceilings Ltd., which will continue to make and market that product. Directors of the new company are: Air Marshall Sir Harold Lydford, Mr J. Staples, Mr F. Dreyfus and Mr P. B. Blood, general manager of the former Isora Division of SFIM (Gt. Britain) Ltd.

Lightweight columns in Ilford

IN the borough of Ilford 665 of these light alloy lighting columns have been erected as part of the borough's seven-year plan to completely re-equip their street lighting system. Manufactured by Alf'd Miles Ltd., of Brockworth, Gloucester, a subsidiary of the Gloster Aircraft Co., the 15 ft columns have been erected in about 40 side roads, with 45 W sodium lamps in post-top lanterns. Virtually climatic non-corrodable alloy to NS5 is used and by a special welding technique the columns are constructed in one piece. Due to their light weight, it is claimed that twice as many can be erected per day than concrete posts and 50% more than steel. Although they do not need painting, those in Ilford may be given a coat of paint to accord with the Council's colour scheme.

Handling these alloy columns is no trouble for the erection gang as may be judged from the picture alongside, taken during work on the Ilford scheme

Glasgow load rising

TO meet the increasing load in the north east area of Glasgow and to provide for two redevelopment schemes there with a total estimated load of 14·5 MVA, the South of Scotland Electricity Board are to establish a new 33/6·6 kV substation on a site adjacent to the Royston scheme. The substation will be supplied from Pinkston power station. The work is to be completed next year at a cost of £94,000.

U.K.A.E.A. REORGANISES

MAJOR changes in the organisation of the United Kingdom Atomic Energy Authority are to come into operation on 1 April. They include formation of a new group, the "reactor group," responsible for design and development of reactors and for relations in this field with industry at home and overseas.

The changes follow a review of the organisation recommended in 1959 by the House of Commons select committee on nationalised industries. Besides establishment of the new group, they involve the appointment of a deputy chairman of the Authority charged with securing scientific and technical co-ordination throughout its activities. This position is being assumed by Sir William Penney, currently the member of the Authority specially concerned with scientific research.

At present, the activities of the UKAEA are carried out in four groups, having the titles: research; development and engineering; production; and weapons. From 1 April there will be five groups: research; reactor; engineering; production; and weapons.

The new engineering group will take over the existing responsibilities of the development and engineering group for design and construction of plant, works and buildings; together with the production group's responsibilities for design and inspection of fuel elements for production purposes.

The research group's structure and responsibilities will remain unaffected by the change, except in one particular. This is the transfer to the new reactor group of the Authority's Winfrith Heath establishment. The weapons group is unaffected by the changes.

Some of the new appointments involved in the new structure are noted on page 295.

E.D.A. Outlines 1961 Publicity

"PLUG in to Electric Living" will play a cardinal part in the Electrical Development Association's publicity this year. The slogan will appear at the head of all advertisements, and the idea will also be developed pictorially in the Press and on leaflets and posters. The plug will never be far away from the Little Boy symbol which will continue to be a cornerstone of the whole campaign. A new series of advertisements will advocate "Electric Living" and other distinct campaigns within the overall framework will deal with water heating, refrigeration and cooking, each timed on a broadly seasonal basis.

Media used directly by EDA will be chiefly the mass circulation Sunday newspapers and weekly and monthly magazines with the emphasis on woman and the home. The most comprehensive range of sales aids ever will be offered to the area boards, including the campaign booklet entitled "All About Electric Living." Details of the campaign are expected to be filled in by Mr J. I. Bernard, director of EDA, on 28 Feb. when he addresses the Association's sales conference at Harrogate.

Consent for 2,000 MW West Burton Station

CONSENT for the first of the CEGB's major Nottingham developments is announced this week, with the Minister of Power granting approval for the West Burton station. To be situated about two miles south west of Gainsborough, this will be the most powerful steam station in western Europe. Generating plant planned consists of four turbo-generators of 500 MW capacity, each supplied by a single boiler of 3,450 klb/hr capacity. Temperature and pressure at turbine stop valve will be 2,300 lb/sq in. 1,050°F, with reheat to 1,050°F.

1965 is schedule date for commissioning of the first unit and the station should be completed by 1967. At its full installed capacity of 2,000 MW it will burn some five million tons of low-grade coal a year, taken from the northern part of the East Midlands coalfields.

Approval is currently awaited for the second station, Holme Pierrepont, which was the subject of a lengthy public inquiry which was completed last month. If approved, this station would absorb a similar tonnage of coal from the southern part of the East Midlands coalfield.

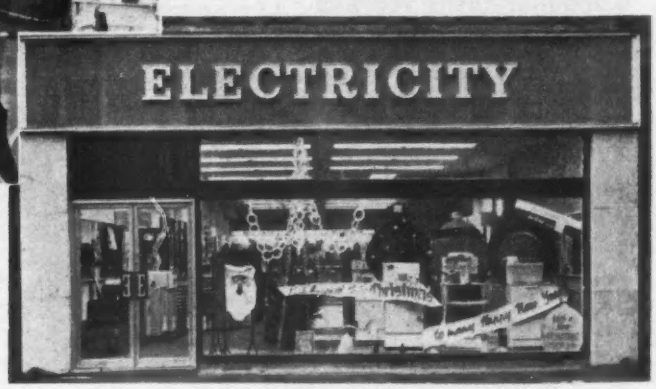
OFFICIAL PUBLICATIONS

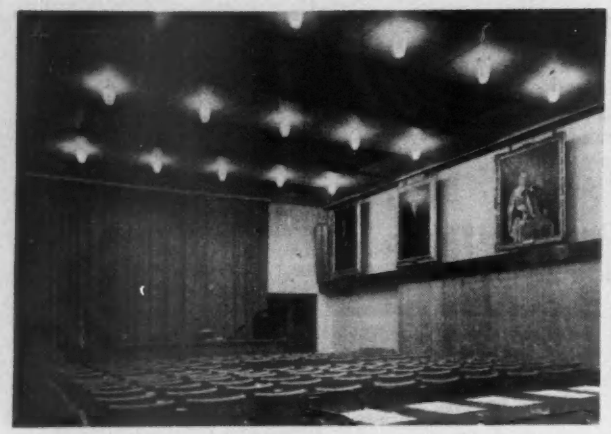
BS 3456. Specification for the testing and approval of domestic electrical appliances. Section A2, electric fires, 5s; Section A3, electric kettles, 4s 6d; section B2, electric vacuum cleaners, 6s.

STOCKTON'S NEW SERVICE CENTRE

The interior of the Stockton showroom, above, shows how a directional emphasis has been achieved by a combination of the flooring pattern and positioning of displays. There are continuous demonstrations of home laundering, automatic cooking, etc. In the exterior view, right, the wide vista window gives a full view of the showroom, which is decorated in attractive shades of grey and light blue. The opening ceremony coincided with the 60th anniversary of the first electricity supply in Stockton

This newly redesigned service centre of the North Eastern Electricity Board at Bishopton La, Stockton, has an open plan scheme covering the entire ground floor. There is now 7,000 W of fluorescent lighting in recessed panels across the ceiling. Appliances and displays are highlighted by tungsten spots, while in the showroom windows low voltage spots give a high degree of lighting without overheating the atmosphere. In all, 2,150 W of tungsten lighting is installed throughout the showroom





In the modernised IEE lecture halls, AEI "Satina" light fittings are suspended in holes in a false ceiling in such a way that the tops of the shades are at ceiling level. The fittings are suspended by flex which terminates in a standard 3-pin plug and socket accessible from above. Cleaning and re-lamping is easily carried out from within the cavity between primary and false ceilings. Electrical contractors were Marryat & Place Ltd.

MORE OIL-BURNING POWER STATIONS

MORE oil will have to be burnt in power stations if demand for electricity continues to rise as fast as at present. The House of Commons learnt this on Tuesday when MoP Parliamentary Secretary, Mr J. C. George, wound up a general debate on fuel and power. He said it had earlier been expected that the amount of oil used for dual fired power stations would fall to three million tons in 1965.

At the end of 1960, the CEGB had achieved the "remarkable" availability figure of 93%. Answering criticisms made during the debate that there was no cost advantage in using oil, Mr George said that on the Thames Estuary and the South Coast, where coal transport costs were high, it was about 30% more expensive to generate from coal than from oil.

The debate had been opened by Mr R. Gunter, the Labour Party spokesman on fuel and power, who forecast an eventual shortage of fuel and made particular complaint about conversion of generating stations from coal to oil. He called for a realistic minimum figure for future coal production to be set.

The Minister of Power, Mr R. Wood, said the Government had to follow a fuel policy set somewhere between the extremes of rigid planning and unfettered competition. He said that at present coal stocks were being lifted at a rate of two million tons a month because demand was exceeding production. He thought overall reduction in stocks would be between seven million and ten million tons during 1961.

1,900 Floor-warmed Dwellings

ELECTRIC floor-warming is to be used in more than 1,900 dwellings to be built in Glasgow on the site of the famous Maryhill barracks. Re-development of the site is to be carried out by the Scottish Special Housing Association to include 26 storey, 15 storey and nine storey blocks of flats and maisonnettes, together with three and four storey buildings. Building is to be carried out in phases over the next few years, with an early start on five 15-storey blocks planned. The South of Scotland EB has been closely associated with the Scottish Special Housing Association in development of floor-warming in domestic premises.

Improving Trade with Iraq

THE difficulties experienced by British construction firms who have undertaken work in Iraq in recent years may soon be eradicated, members of the trade mission who have just returned from a ten-day visit to that country stated in London last week. Mr H. G. Nelson, managing director of the English Electric Co. and leader of the mission, referred to discussions the party had had on the problems facing British businessmen wishing to establish personal contact with their Iraqi counterparts. Arrangements had now been made with the Iraqi Embassy in London to facilitate British visits to Iraq, thereby removing a major obstacle to increasing trade. He felt there was scope for maintaining and improving trade there, particularly as British contractors returned to the territory.

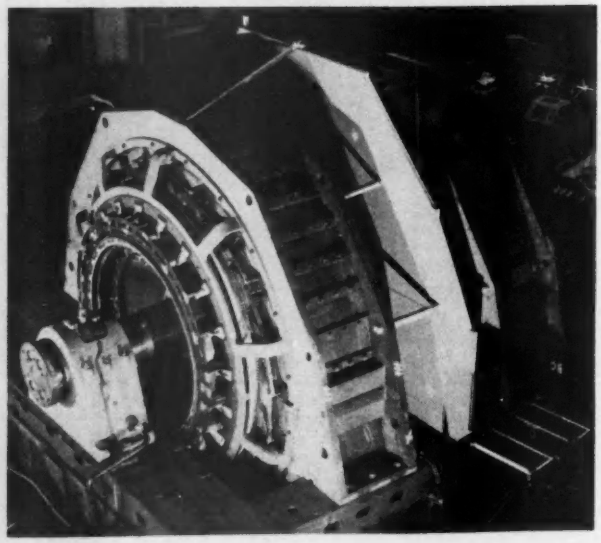
Temporary Power Supplies on Construction Site

THIRTY-FIVE portable transformer substations specially designed by South Wales Switchgear Ltd. have been supplied to provide temporary electricity supplies during construction of Richard Thomas and Baldwin's new Spencer steelworks at Llanwern. Each substation is mounted on a toboggan-type skid to enable them to be moved around as required. The main intake was provided by the erection of an 11 kV overhead cable running the whole length of the site, with tap-off points at suitable intervals. From the l.t. side of the transformer there are six outgoing feeders in four-core p.v.c. cable to the various contractors on the site. Total load for the construction work being about 10 MW. Each transformer unit consists of a 500 kVA transformer equipped with a six-circuit outgoing fuseboard.

Canadian Firms Warned Against U.K. Recruiting

A WARNING concerning Canadian advertisements in UK newspapers for radio and television technicians has been given in Ottawa by the Immigration Minister, Mrs H. Fairclough. Canadian employers who chose to go direct to the UK in recruiting ventures had no assurance that applicants, if found, would be allowed to enter Canada, she pointed out. The usual procedure for Canadian firms seeking personnel was to advise the National Employment Service, which tried to fill the posts with Canadian applicants before referring the openings to its London office.

Winders for Africa



Believed to be the largest converter fed winders in the world, and the first to operate on a very high voltage system, these two 6,030 h.p. motors, here seen on test at the Stafford works of English Electric, are for the West Driefontein and Doornfontein mines of Goldfields of South Africa Ltd. The winder converter transformers will be directly connected to the 40 kV grid. Balanced winding with skips having a pay load of 10 short tons will give an output of 277 tons/hr from a depth of 6,000 ft

Birmingham Wholesalers' new H.Q.

OPENING the new £50,000 premises of Rich and Pattison (Birmingham) Ltd. in Kent Street, last week the Lord Mayor of Birmingham, Ald. G. B. Boughton, remarked that it was good to see that the concern had not achieved its development through a take over. The new premises of these electrical wholesalers, and manufacturing engineers, occupy a site of 1,120 sq yd, being generally of two storey construction with a single storey wing, as our photograph alongside (by *Birmingham Post* Studios) shows. There is an extensive showroom for domestic appliances and fittings. Established in 1904, it is still a family business, of which Mrs E. Rich, widow of the co-founder, is chairman, and her son, Mr W. Rich, managing director. In addition to its wholesaling business, the company also has an engineering department which makes special control panels, and other industrial equipment.

£5,000 offered towards Underground Line

AN offer of up to £5,000 towards the additional cost of installing underground power cables in the Borrowdale Valley was made by the Friends of the Lake District at the public inquiry into the North Western Electricity Board's plan, held at Rosthwaite last week. For the Board, Mr J. G. Geach explained that it was planned to extend the system from the village of Rosthwaite to 56 consumers in the upper reach of the valley. Part of the line would be underground, but a 4,000 yd section would be erected on 25 ft poles. He referred to the long-standing disappointment of the local residents in not getting an electricity supply—two earlier plans had been defeated. He asserted that the proposals would in no way injure the amenities of the valley. There was no justification for putting the lines entirely underground, which would involve an additional expenditure of £10,000, he said.

But Mr P. Cleave, secretary of the Friends of the Lake District, contended that o.h. poles tended to make a valley look urban and banal, but rather than jeopardise the supply of electricity to the valley, they offered the £5,000 contribution referred to above.

Mr K. S. Himsworth, clerk to the Lake District Planning Board, said the latter could see no difference between the upper part of Borrowdale and the lower reach of the valley, where the Board had placed the cables underground. Indeed, they considered Upper Borrowdale to be well worth the price put on it by the Board and felt that the national economy could well afford the comparatively higher cost of reconciling the conflicting interests.

The inquiry was closed and the following morning Mr H. W. Grimmitt, of the Ministry of Power, who conducted the hearing, walked the route of the disputed line.

Now—a Route Warden

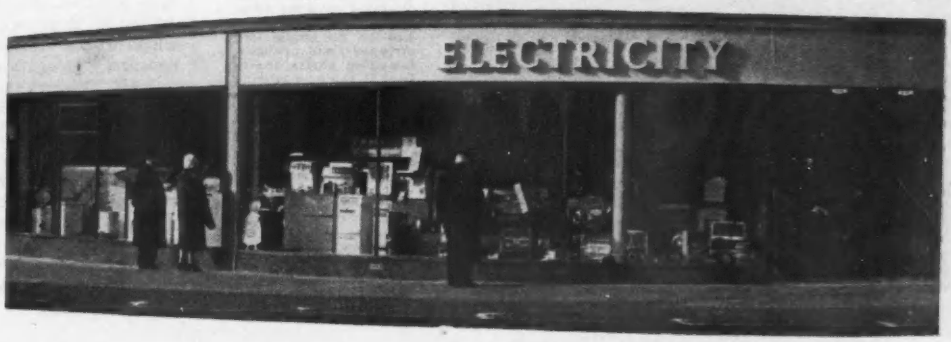
APPOINTMENT of a "route warden" in connection with the laying of a 132 kV cable between Chessington and Kingston power station is the innovation of Mr W. H. Dunkley, South Eastern Divisional Controller, CEGB. The warden, a foreman cleaner at Kingston power station, is given the task of explaining to frontagers along a seven-mile stretch of road why the the CEGB is tearing up the road or footpath in front of their houses or shops. He will patrol the sections where work is in progress, answering questions and where necessary reporting to higher authority for quick action on any complaints. An exhibition of the various types of cable being used is on view at Bentalls' store.

INQUIRY FOR WYLFA?

AS some 30 organisations and individuals have lodged objections to the proposed Wylfa Head (Anglesey) nuclear power station, it is expected that the Minister of Power will call for a public inquiry. One of the principal objectors is the Cemaes branch of the National Farmers' Union who, it seems, would withdraw if assurances on the effect on unemployment, local agriculture and safety are given. A number of local inhabitants have also lodged objections, mainly on the fear of radiation and loss of amenities. But Anglesey County Council, Twrcelyn RDC and the parish council have already given outline planning approval to the scheme.

Sizewell Line still Undecided

THE route of the proposed supergrid line from Sizewell nuclear power station to Sundon, Beds, is still far from agreed. Although East Suffolk Parish Council's Executive Committee have accepted the revised route (ELECTRICAL TIMES, 9 Feb. issue) East Suffolk County Planning Committee have decided to ask the CEGB to look once again into the matter of the route. The line previously submitted for the committee's comments and provisionally approved was agreed, except for the section immediately north of Bramford. Here, the Gipping RDC suggests the route be slightly amended in the vicinity of Fisons' works. The RDC consider the present route would cross good land which they had earmarked for future development. If the line was placed north of Fisons' works instead of south it would cross marshland, at present unwanted. It was agreed that this section should be the subject of further talks with the CEGB. The site for the proposed new grid substation at Bullen Wood, Bramford, was agreed, but details of the scheme are to be discussed further with the Board.



This new service centre of the East Midlands Electricity Board at West Bridgford, with a 40ft window frontage, occupies a commanding position on the site of a former cinema. The whole of the premises, including the first floor, are heated by 26 kW of electric floor-warming

Telecommunications Satellites for Britain?

THE Rt Hon Reginald Bevins, Postmaster-General, having been prevented by a protracted committee stage of the Post Office Bill from attending the 1961 TEMA dinner, his place was taken by Deputy Director-General W. A. Wolverson, C.B., last week. Illness had also prevented the chairman of the TEMA Council, Mr R. A. Moir, O.B.E., M.C., from presiding, and the vice-chairman, Mr F. W. Oakley, deputised. Proposing the toast of the Association, Mr Wolverson, on behalf of the PMG, outlined the plans for Britain's telephone and cable system in the future. It was an objective for all subscribers to be able to dial calls to anyone else with a telephone in the world and to this end the first stage, that of converting all exchanges here to automatic working, was well in hand. The development of subscriber trunk dialling was also going ahead and by the spring of 1964 it was hoped to provide facilities for semi-automatic working between Britain, North America and Europe, with world-wide subscriber dialling as the ultimate goal.

It was not, however, practicable to think of world communications only in terms of cables, and a UK team had recently visited the US to study developments in satellite communications there. As a direct result it had been decided to go ahead with the erection of a ground radio station with a large steerable aerial system for satellite communication tests. For all of this the Post Office needs, and will continue to need, additional capital. The Post Office Bill sets out to enable the GPO to retain its profits for development purposes instead of contributing them to general revenue. The standard of performance during the past three years must help to secure more favourable treatment than might otherwise be the case and, if this is forthcoming, the GPO and industry could face the future with confidence.

Lord Chandos, replying, drew on his own departmental experience for comment and congratulated the PMG on the achievements so far. Speaking of manufacturers he believed that they were a progressive lot and had done a full measure of research for the Post Office, with also an impressive record in exports. Relations with the Post Office were happy and the PMG could make them happier still by keeping on increasing the orders.

Among the distinguished guests present were Sir Hamish MacLaren, president, IEE, Sir Harry Melville, DSIR, Sir Alexander Clutterbuck, Commonwealth Relations Office, Sir Robert Hall, K.C.M.G., Sir Ben Barnett, Sir Reginald Taylor, Dr R. L. Smith-Rose and Dr J. N. Aldington.

Coal output plans

DESPITE changes in economic circumstances since NCB overall plans were made, it is still the intention of the Board, with the approval of the Ministry of Power, to work for a mining capacity giving 200 million tons coal output in 1965. Stating this in the House of Commons, Mr R. Wood said the assumed total of fuel requirements would be 300 million tons coal equivalent.

Sheffield's Fridge Trouble for Council Meeting, 1 March

THE proposal for Sheffield Corporation to rent refrigerators to council house tenants is due for full consideration at next week's meeting of the City Council. This undertaking was given to Mr H. Dilly, secretary of the recently formed Sheffield Electrical Traders' Protection Association, by the chairman of the Housing Committee, Councillor G. Cooper, following a discussion on the matter.

A deputation from the Association argued that it was unethical for the Corporation to trade in competition with ratepayers, that the £900,000 it was proposed to spend on the scheme was not justified in view of the Chancellor's plea for spending to be reduced and that the Corporation tenants were being offered a service which was not available to other citizens.

Local traders were anxious to supply Corporation tenants with refrigerators, but were restricted by a Government order making it obligatory to charge a substantial deposit. The Corporation was trying to evade this order by seeking to make refrigerators landlord's fittings, it was contended.

RECENT LARGE CONTRACTS

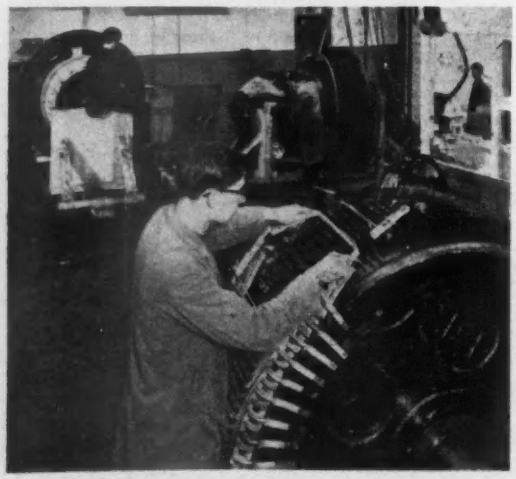
A £200,000 contract for 15 miles of 33 kV flat oil-filled pressure cable and other 11 kV control and overhead cables has been placed with Enfield-Standard Power Cables Ltd. by the Electricity Corporation of Nigeria. The cables are intended for the Lagos distribution system and, in fact, this will be the first 33 kV underground cable in Nigeria. Consulting engineers for the project are Preece, Cardew and Rider.

RECENT contracts awarded to Crompton Parkinson Ltd. in New Zealand amount to over £158,000. They comprise switchgear and associated equipment for extensions to the Christchurch Municipality's distribution system, a.c. motors and static equipment for the Tasman Pulp and Paper Co. and a large quantity of 22 kV paper-insulated cable for the Auckland Electric Power Board.

A £299,302 contract for pneumatic fly ash extraction plant for Nos. 4 and 5 boilers at Kincardine power station of the South of Scotland Electricity Board has been awarded to John Thompson Industrial Constructions Ltd. The plant is similar to that installed by the company for the first three boilers in the initial stage of three 120 MW sets. The extension will have two 200 MW units. They have received a £70,212 contract for hydraulic fly ash disposal plant which, with those on the first stage, will pump slurry three miles down river to Longannet, where 280 acres are being reclaimed for agricultural purposes.

DIESEL generating sets for Ghana and the Isle of Man have been ordered from Mirrlees, Bickerton and Day Ltd. A 2,950 kW Mirrlees/Brush set is to go to augment the Ashanti Goldfields Corporation's power station, raising output to 8,850 kW, and the other order is from Douglas Corporation for another 2,200 kW set for Pulrose.

A CONTRACT for a closed-circuit TV system for the new £14 million plate mill of the Consett Iron Co. has been placed with Epsylon Industries. Worth over £7,000, the contract calls for nine camera channels, 6 in. by 14 in. monitors, video switch units and control cubicles.



Quick Repairs

Work in progress at the Birmingham works of Arco Rewinds on three 700 kW generator armatures from the liner *Cape Town Castle* which had boiler room flooded due to fire while at sea. The armatures had to be completely stripped and rebuilt, including shafts machined to the new bearing size and commutators machined after winding. Continuous day, night and week-end working enabled the company to keep to the quoted delivery time—three weeks—an essential factor as, with the ship in dry dock, plates had been removed to allow the armature to be taken away. The *Cape Town Castle* sailed again on time.

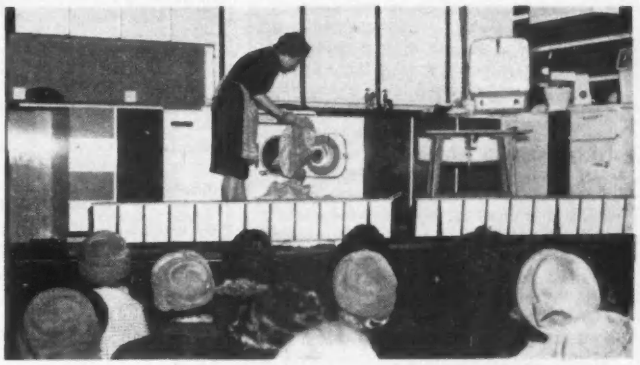
All mod. cons. now for Chelsea Pensioners

DO Chelsea Pensioners use electric razors? Evidently they do, for the new infirmary now in full use for the 400 pensioners at the Royal Hospital in Chelsea, officially opened by Queen Elizabeth the Queen Mother yesterday, has electric shaver sockets in each of the wards. Tungsten lighting is installed throughout, except in the main canopy and handicrafts room where fluorescent fittings are installed. VHF/FM radio receivers serve the bedhead units and loudspeaker sockets in other suitable parts of the building. At the head of each ward bed the patient finds a panel providing him with headphones and a selection switch for two radio programmes, a lighting switch, call bell and general-purpose socket and switch.

The large kitchen has electric dish-washing and waste disposal machines, and refrigerators and electrically heated food trolleys are used in the serving of meals round the wards.

There are air hand-dryers for the staff, lifts and a linen hoist serving the ward block and, a sombre thought, a self-contained electrically powered air-conditioning unit serving the mortuary in the basement. The electrical installation was carried out by Iveson Electrical Ltd. and lifts supplied by Evans Lifts Ltd. The new building replaces the old infirmary which was destroyed by bombing in 1941. The main contractors were Sir Lindsay Parkinson and Co. Ltd.

A playlet "Time for Style" is being utilised in the No. 2 (Huddersfield) Sub-area of the Yorkshire Electricity Board, to attract members of various women's organisations to what is, in effect, a demonstration of a multiplicity of appliances. Members of the Board's demonstration staff fill roles in portraying a busy housewife who has to do her washing, washing-up and cooking in addition to fulfilling an appointment at the hairdresser in readiness for an evening out. This sequence of events enables the demonstrator, as the housewife, to show the advantages of automatic electrical apliances in accomplishing several domestic tasks simultaneously. The stage set is shown alongside



ELECTRIFICATION IN SUFFOLK

INTEREST in the Eastern Electricity Board's "Operation Roundup," which is designed to complete rural electrification in the 8,000 sq miles of the Board's area in 1966, is still very strong, though the plan was announced last autumn. As part of the plan the Suffolk sub-area recently announced the start of a £35,000 zonal plan to supply a remote part of Suffolk in the Stowmarket area; and when the Board held a meeting at Haughley, in conjunction with the National Farmers' Union and the Country Landowners' Association to explain their plans for providing electricity for the Upper Town and for the Gt Ashfield district, 60 farmers turned up to hear Mr H. Judd, the sub-area engineer, detail the properties which would be connected. There were 42 farms, seven farm-houses, 12 council houses and 70 cottages, he explained, and the work would involve converting 3½ miles of existing line and putting up 16 miles of 11 kV line, together with 42 pole-type transformers and nearly four miles of l.v. line.

He emphasised that farmers who were prepared to make the most use of electricity would be most likely to be connected first. One of the major problems was in obtaining wayleaves, and again he stressed that priority would go to those places where permission was quickly and readily granted. "Farmers may appreciate the need for granting the Board wayleaves when their own farm is concerned with a supply, but occasionally they fail to appreciate the need for additional poles on their land when the supply is for others," he said.

Commercial Travellers Still Essential In Changing Trade Pattern

THE commercial traveller will continue to be necessary even with the present pattern of retail trade changing rapidly towards the self-service store; the supermarket and discount house, Mr T. A. H. Sycamore, C.B.E., managing director of Oxo Ltd. and president of appeal, Royal Commercial Travellers' Schools, declared at the annual luncheon of the Electrical Trades' Commercial Travellers' Association, last Friday. No selling exercise could be truly successful without the salesmen. Call them what you will, the commercial traveller was essential today and would be vital tomorrow, but today's commercial traveller must command a better salary, he added.

Replying, Mr J. D. Lake, president (of AEI-Hotpoint), in speaking of Britain's balance of payments problem, emphasised that we had to sell more to earn more and so improve the standard of living. The problem would not be solved by accountants or economists, but by the sales people, provided that they set an example in eliminating the attitude that we were too proud or too shy to tell everybody that our products were the best, he maintained.

The toast of "Our Guests," proposed by Mr D. N. Hyde (of AEI-Hotpoint), chairman, was responded to by Mr H. C. Poore, district manager, West Kent district, SeeBoard, who paid tribute to the work of the Association with which he had close personal contact. A collection made at the function realised the record sum of over £286.

At the annual luncheon of the ETCTA last Thursday, left to right: Mr H. C. Poore, Mr J. D. Lake (president), Mr T. A. H. Sycamore, and Mr D. N. Hyde (chairman)

Technical Training Schemes in Wales

THE training scheme of South Wales Switchgear Ltd. was featured in a BBC television broadcast from Wales recently, which was intended as a foretaste of Commonwealth Technical Training Week in Wales, from 29 May to 4 June, during which the Duke of Edinburgh is to visit Cardiff. Three SWS apprentices who took part in the broadcast referred to the lack of facilities for technical education in their home areas and spoke of their pleasure at finding such facilities in circumstances that enabled them to remain in Wales. The training of local talent by SWS has been in operation for many years.

B.T.C. investigates new traction principle

WHEEL-SPIN and skidding are said to be non-existent in a new form of electric rail traction reported to be under investigation by the BTC. The principle of operation is similar to that of a 3-phase induction motor except that there are no rotating parts. Instead the locomotive carries a 3-phase electromagnetic field system whose pulsating flux cuts an aluminium plate which is bolted to the track. The combination forms what is known as a "linear induction motor" which, it is claimed, gives the locomotive excellent acceleration and makes possible train speeds of up to 200 m.p.h. One of the main practical difficulties to be overcome before the idea can be adopted is to find an economic means of supplying 3-phase power. A 400 h.p. prototype "motor," designed originally to drive a coal conveyor, has been built and is to be tried out on a length of indoor track. If test results for this track show promise, a seven-mile length of existing railway track near Rugby is to be converted for further experiments. London Transport are also said to be interested in a version of the system, for boosting train acceleration and braking.

Civils Progress to Amalgamation

BY a majority of three-to-one members of the Institution of Civil Engineers have voted approval for amalgamation of the Institution with the Institution of Municipal Engineers. This merger would be a major step in unification of professional institutions, involving over 31,000 engineers. As already announced, a postal referendum of members of the Institution of Municipal Engineers showed a majority of three-to-two in favour of amalgamation. This latter postal vote is not final, and the matter is to be decided at a special general meeting of members of the I.Mun.E. in June.

Sayings OF THE WEEK

"We have waited so long for electricity that these poles, if they do come, will be looked upon by the local people as things of beauty." . . . REV R. PRATT, vicar of Borrowdale, at inquiry into overhead lines to upper Borrowdale Valley.

"The commercial traveller is essential today. In my view he will be vital tomorrow." . . . MR T. A. H. SYCAMORE, at the ETCTA annual luncheon.

"One cannot help thinking that competitive tendering is one of the most wasteful sources of overhead costs ever invented." . . . MR D. E. GIBSON, Director-General of Works, War Office, and Hon. Sec., RIBA, speaking at the Electrical Contractors' Association dinner.

PRICES of cable metals and other materials

Figures quoted are the official prices ruling on Tuesday, February 21

	£ per ton	Weekly change £
COPPER, standard class A (settlement) ...	226½	+3½
" (3 months)	226½	+2½
LEAD, refined pig, 99·97% purity (cash)	67	+1
" (3 months)	67⅛	+⅛
TIN, refined, min. 99·75% purity (settlement)	797½	+7
(3 months)	800	+6
ALUMINIUM, ingots 99·99·5% ...	186	—
" wire bars (4×4×54")	193½	—
BRASS Strip 63/37	199½	—
SILVER (Troy oz)	79⅛d	—

	£ per ton	Weekly change £
ZINC, virgin, min. 98% purity (cash)	84½	+½
" (3 months)	83½	+½
RUBBER, per lb.		
No. 1, RSS, spot	24½d	−⅛d
c.i.f. basis, ports, April ...	23⅛d	−⅛d
ARMOURING:		
Galv. Steel Wire (0·104 in.) ...	66½	—
Mild Steel Tape (0·04 in.) ...	53*	—
NICKEL (home)	600	—
MERCURY (76 lb flask)	69	—
AMERICAN PRICES:		
Copper, electrolytic (per lb) ...	29c	—
Lead, (New York)	11c	—

* *Tape Price, now on average, includes varnishing*

FRENCH v. GERMAN MONORAILS

HIGH speed and acceleration with inherent stability are the main advantages claimed for the electrically powered monorail system developed by the French firm of Societé Lyonnais des Eaux et de l'Eclairage. It is one of two such systems being investigated by the British Transport Commission, BEA and BOAC as a possible means of transportation between London Airport and central London. In the French system, the pneumatic-tyred car is suspended from a "split-box" section rail and is capable of speeds of 70 m.p.h. and of providing a 90-sec service. Capital cost of track installation, excluding wayleave charges, is estimated to be £1,600,000/mile. By comparison, the German ALWEG-System, in which the car straddles a hollow, reinforced-concrete beam, is stated to cost only £800,000/mile, but has a lower service speed. There are already plans for installing this system in various parts of the world, stages of construction having been completed in certain instances. Both the French and German firms have built short lengths of experimental monorail track which have been in operation for some years.

Aluminium Welding Information

INFORMATION on welding of aluminium by the two inert gas shielded processes "TIG" and "MIG" is given in a new Aluminium Development Association publication, "Notes on Process Selection and Filler/Electrode Materials." The notes are an addendum to the Association's information bulletin No. 19 on the arc welding of aluminium, and may be obtained from the Association at 33 Grosvenor Street, W.1.

An Old-stager

This "Magnet" electric kettle, made by GEC, has been in regular use since 1911 without a breakdown, and has been handed on by one Fulham housewife to her neighbour. Of tinned copper, it has the original "Archer" 1 kW heating element embedded in enamel

Too Edwardian?

TOO many people were still living in the Edwardian age when Britain was the leader of the world in many directions, including manufacturing and export, asserted Mr A. Albu, M.P., at last week's meeting of the Electrical Industries Club. Whereas we could then always rely for trade upon our Commonwealth countries, now we had to compete with other industrial nations. We are now much more dependent upon our exports and if these declined our influence would decline also, he stressed.

Col B. H. Leeson, president, was in the chair. The next meeting is on 14 March.

News in Brief

EMI Electronics Ltd. have been selected as the main supplier of studio equipment for the new Radio Eireann television service due to open in November.

Official title of the Fire Offices' Committee Fire Protection Association has now been changed to the shorter form "Fire Protection Association." The Association continues to operate from 31 Gresham St, E.C.2, and the change of name will not affect its activities nor its relationship to the Fire Offices' Committee.

Stratton St. Margaret Parish Council have approved a £17,000 scheme for Class II lighting on five miles of through roads.

Electrolux Ltd. have this week also introduced short time working on cleaner production at their Luton works.

Company Activities

THERE is no doubt that markets stopped to think over the implications of the latest industrial survey by the Federation of British Industries which indicates that the biggest limiting factor on industrial output has now become a shortage of orders rather than a shortage of skilled labour. Answers from 752 chairmen and managing directors over a wide and representative range of industries not only build up a picture of shrinking order books but also reveal that the rate of new orders received in the last four months has been much less than the manufacturers forecast four months ago. Nor are the FBI's own conclusions very happy. Pointing out that increased wages and material costs, against only a steady level of output, has led to the biggest rise in costs per unit in 3 years, they warn that the continuation of this trend "would produce a disturbing situation—falling orders coupled with rising stocks could lead to a cut back in production and employment while rising costs would jeopardise our export competitiveness." Markets promptly took one step backward!

But not for very long. News that Britain exports last month jumped, on a seasonally adjusted basis, from £302 million in December to £319 million brought back a mild degree of cheer to the market. True imports also rose so that the trade gap fell only £3 million to £70 million, but interpretation by financial commentators that these figures indicate a trend for the better set the ordinary share indexes edging once more forward.

Electrical shares, too, tended to reflect this "off-on" mood of the market. Among those which responded in this way were BICC, Dimplex, EMI, and Plessey. All however closed the week a little duller than they had started out. Dull, too, were the shares of Crabtree Electrical Industries, makers of electrical switches, plugs and motor-starters, etc. Despite the increase in the half-time payment—5% against 3¼%—the shares dropped from 34s at the beginning of the week and from 33s 6d to 32s 6d after the dividend news to close the week at 30s 6d. Reason? Chairman Mr J. Crabtree warned that the final results for the year may not be materially better than last year.

But there was at least one bright spark to excite attention—and that was provided by Chloride Electrical Storage Co, whose final results will soon be due and, which must have had a very successful financial year to end-December 1960. So persistent demand for the shares over the week lifted them from 76s 6d to 85s. Decca, too, was a good spot with the ordinary shares spinning up from 59s to 60s and the "A" ordinary riding 1s higher over the week at 58s.

News that English Electric, where Lord Nelson is chairman, is maintaining its total dividend at 10% and that the group profit was down only £73,263 at £6,661,462 perked up the £1 ordinary shares only by 3d to 33s 9d, but in view of the 1960 difficulties for much of the heavy electrical industry, the group's profit performance must be considered extremely satisfactory. Over the week AEI lost 6d a share at 40s 6d, and GEC dropped a 1s to 31s 3d.

None the less, it is heartening to those who follow the fortunes of the Electrical industry to learn that 1960 has been kinder than expected although for the current year the now overcasting shadows of the FBI conclusions must cause some very real concern.—*From our City Correspondent.*

Crabtree Electrical Industries

The interim dividend is raised from the equivalent of 3¼% to 5% for the year ending 31 July next, in order to bring it more into line with the final. Turnover is still increasing, but profit margins are tending to reduce on account of increases in wages and costs of materials, Mr J. A. Crabtree, the chairman, reports. He warns that the final results for the year may not be materially better than last year.

Hubert Davies and Co.

After larger taxation charge, net profit for the year to 31 Oct. last for this South African concern is £207,099 (*£168,012*), and a final dividend of 10% again makes the total 17½%.

English Electric Co. Ltd.

After a depreciation charge of £3,057,550 (*£3,571,162*), group profit for 1960 at £6,661,462 was only £73,257 below that of the previous year. It is stated that the 1960 figures are not directly comparable with those for 1959 because English Electric Aviation ceased to be a subsidiary on its acquisition by British Aircraft Corporation during last year. Taxation this time absorbs £2,869,396 (*£2,575,466*), and a final dividend of 7% again makes the total 10%.

Hoover Ltd.

In view of trading conditions in the home market, the group profit for 1960 —£6,372,783—although over £4½ million down on the previous year's record total, may be deemed satisfactory. A final dividend of 40%, making 45% for the year on capital doubled bulk scrip issue, is, in effect, the same as before. After taxation of £2,196,548 (*£5,208,460*), net profit is £3,520,965 (*£5,485,662*). It is stated that exports increased by 37% on the year.

International Combustion (Holdings)

As foreshadowed when the interim dividend was announced last August, the group profit for the year ended 30 Sept. fell to £871,277, from the previous year's figure of £1,453,659, after a UK charge of £1,004,341 (*£1,542,135*). A final dividend of 20% keeps the total distribution at 30%. One subsidiary has transferred £250,000 (*same*) to reserve for contract contingencies and another subsidiary has appropriated £20,000 (*nil*) to reserve for development and research.

Marconi International Marine Communication Co.

After taxation, etc., group net profit for 1960 is £304,276 (*£264,624*), and a final dividend of 5% raises the total to 7½%, against the equivalent of 6% for 1959.

Marconi's Wireless Telegraph Co.

Group profit for 1960 after depreciation and other charges, but before taxation, dropped sharply to £371,732 (*£900,715*). With taxation taking £66,840 (*£445,745*) and £200,000 (*nil*) provided for subvention payment to a fellow subsidiary, net profit is £57,892 (*£411,470*). There is no dividend this time (10% was paid for 1959).

Negretti and Zambra

Group profit for the year to 30 Sept. last dropped to £145,828 (*£227,300*), but a final dividend of 11% maintains the total distribution at 15%.

Parkinson Cowan

Group operations for the first 12 months of the current 15 months period ending 31 March were barely profitable, Mr H. P. Barker, chairman, reveals. Proposing an increase in borrowing powers, the directors explain that in recent years the group's activities and turnover have greatly increased. In the past three years two businesses have been purchased for cash from current resources, the Manchester factory has been substantially extended, and a new factory built in Canada. As the issued share capital has not been substantially increased since 1930, it had been clear for some time that it would soon be desirable to increase the capital. It had been hoped to do this in 1960, but unfavourable developments plus the Government's restrictive measures made this inopportune. The recession in national markets for most domestic appliances has continued, and the adaptation of this branch of activities to a lower level has resulted in a temporary increase in stocks. Coupled with a slower rate of development in other divisions these conditions have adversely affected results more than was earlier anticipated, and the group has not been able to accumulate funds from this source as normally.

Vent-Axia Ltd.

Now a subsidiary of Hall-Thermotank, this concern achieved a group profit of £294,184 for the year ended 30 Sept., compared with £162,161 for the previous six months.

OVERSEAS NEWS

from our correspondents abroad

CANADA

Columbia-Peace Again

While reports suggest that negotiations for the sale of Peace River power have been shelved by the British Columbia Energy Board until the current study of the Province's hydro developments is available, the BC Hydro Commission is going ahead with studies on development of the Columbia project and has appointed five Canadian firms to undertake preparatory work; they are: Canadian Bureau of Allied Engineering, Crippen Wright, Shawinigan, Montreal and H. G. Acres.

The first annual report of the Energy Board hints that integration of the Peace and Columbia projects may be recommended. Reports from Ottawa suggest that the Federal Government is unlikely to increase its offer to help the BC Government to finance Columbia River development. It was hoped, however, that the Finance Minister, Donald Fleming, would soon be arranging a meeting with Premier Bennett, of British Columbia.

Nuclear Competitive in 1964?

Estimates recently given by the President of Atomic Energy, of Canada, for power from the CANDU heavy-water moderated reactor scheduled for commissioning in 1964 put the cost/kWh at 5·99 mills. For a two-unit station he said the price could be cut to 5·16 mills, comparing favourably with the 5·13 mills/kWh anticipated in 1964 for coal-fired stations. Comparative costs for the UK graphite-moderated reactor was 6·6 mills and for the US boiling or pressurised water reactor about 5·4 mills to 6·1 mills. Note: 1 mill=$1/1,000.

Minister of Manufacture Wanted

Appointment of a Minister of Manufacturing is advocated in a brief submitted to the Federal Government by the Canadian Electrical Manufacturers' Association, said the president, Mr J. W. Kerr, recently. Such an appointment, he said, would be an encouragement to those who guide the labour force to recognise the country's economic position and to exert restraint in framing current and future wage demands.

Refrigerator Export Likely

Products of Kelvinator of Canada are to be offered in Europe and the USA in competition with the products of the US parent company. The international distribution facilities of the International Co. will be used and Canadian exports will depend on whether competitive priced commodities can be offered.

Quebec Hydro in 1960

The addition of 553 MW of hydro-electric generating plant by the Quebec Hydro-Electric Commission during 1960 brings the generating capacity to 3,292 MW. The plant added represents 40% of all new plant in Canada to which reference was made in ELECTRICAL TIMES for 2 Feb., 1961. Schemes under construction include the Carillon and Beauharnois projects, which will add 740 MW to the metropolitan system and further installations, exceeding 4,400 MW, are under active planning. A 113·5 MW thermal plant is also reported to be under consideration at St. Maurice, 165 miles north of Trois Rivieres.

Expansion plans by the Quebec Hydro and Shawinigan Water companies are expected to cost $934 million up to the end of 1964.

CUBA

Dutch Firm Seizure

Four subsidiaries of Philips' Lamps, of Eindhoven, have been seized by the Castro Government. The companies, concerned with distribution, technical advice and a holding group, represents an investment of about £283,000. For some months the companies have been negotiating with the authorities and had asked permission to close two of them because of drastic import restrictions on radios and other electrical products. The request was refused, but it was suggested that they should distribute Soviet light bulbs and other goods. This offer was declined. It is thought that seizure will probably be followed by formal nationalisation soon.

PARAGUAY

Hydro Discussions Continue

Discussions on three major hydro-electric projects in Paraguay have been continued over the last few months. Proposals for a hydro plant near to the Acaray and Monday Falls is still under study. This plant, with a proposed capacity of 400 MW is expected to be carried out in three stages. Discussions began in December on a plant at the Apipe Falls to be undertaken by the Argentine and Paraguayan Commission and further talks continued on the joint Brazilian/Paraguayan project on the Alto Parana River.

GHANA

Volta Tenders Opened

Three bids for civil work on the first part of the Volta River project were opened last week in Accra. The Morrison Knudson-Taylor Woodrow consortium submitted bids for alternative plans of £21,214,000 and £21,431,000 with a third bid of £19,571,000 if protection was given against labour wage increases and fuel price fluctuations. Other quotes by two Italian consortia ranged from £14,821,000 to £15,903,000. A tender was also submitted by the Parkinson Howard, Cementation, Royal Dutch, Ransomes and Rapier group.

MAURITIUS

Diesel Station Programme

A 40 MW diesel station is to be constructed at Fort George in the Port Louis harbour area. This scheme by the Central Electricity Board has, as its first stage, a project estimated to cost £1 million and due for completion in 1963.

PAKISTAN

Loan to E. Pakistan Possible

Financial aid may be extended to WAPDA schemes in East Pakistan after they have been examined by World Bank experts. This was stated by the leader of the mission, Dr Harold Larsen, in Dacca recently. In addition to such large projects as those at Karnafuli and the Ganges-Kobadek, over 450 smaller schemes including irrigation and flood control are in hand.

Hydro Project in Second Plan

Although by 1965 nearly 382·7 MW of hydro-electric installed capacity will be available, this only represents 3½% of the Pakistan water power potential. This was stated in a recent review by Dr Quraishy, chief of the Water and Power Section Planning Commission. Estimates suggest that the hydro potential of West Pakistan is ten times that of East Pakistan and both provinces could provide 11,000 MW although, in East Pakistan, project extension is hampered by the flat terrain. In 1960, hydro capacity had risen to 313 MW, five times that in 1955 and a further increase of about 132 MW is planned by 1965. Additional generating capacity may be possible at both the Rasul and Warsak schemes and investigations are in hand for a number of other schemes such as those on the Zhob-Gomel system of rivers and the Kunhar River. Estimated potential of the Zhob-Gomel is 100 MW and of the Kunhar River, 500 MW firm power with an additional 195 MW in high flow periods. The Teesta River could also possibly provide 18 MW, which could be doubled during high-flow periods. The Mangla Dam on the Jhelum River scheduled for operation in 1968 and the Tarbella Dam on the Indus River.

scheduled for construction to begin in 1963, are anticipated as providing 300 MW increasing to 500 MW and 500 MW increasing to 1,000 MW, respectively.

Private Companies Threatened

That the Government was in no mood to acquire private electric supply companies was reported to have been said recently by the chairman of WAPDA. He added that WAPDA had been asked by the Government to cater for the needs of consumers at present supplied by private companies. Owners of the Multan and Rawalpindi companies had rejected what was considered by the Government fair compensation for their takeover, despite efforts trying to persuade them to come to terms. The Authority, the chairman said, had already begun laying cables in the area served by Rawalpindi and Multan companies and was supplying power to industrial and domestic consumers where possible. Similar action would probably be taken in Jhang. Efforts were being made to speed up construction of the WAPDA networks and it was anticipated that consumers would switch over to these, for electricity would be cheaper than from private undertakings. The private companies, he said, would have to compete with WAPDA for survival and, eventually, it would probably not be worth while taking them over. The licensed area of the Rawalpindi company includes Jhelum. WAPDA had laid cables in this town a month ago. In a month's time it was hoped to supply power to Rawalpindi as well.

INDIA

Power Cuts in Punjab

Power cuts imposed since mid-December in the Punjab were relaxed for a trial period at the beginning of February. The cut, imposed through a shortage of water, amounted to 10% on all consumers and peak-period shutdown for certain industrial and trade consumers.

Bhakra Second Set

The second 90 MW hydro-electric generator at Bhakra was commissioned recently. The generator will supply power to the Nangal Chemicals factory and was originally intended for commissioning in December last year. The third unit, scheduled to be in operation in May, will supplement the supply to Delhi by 40 MW. The Punjab is already supplying 20 MW to the city.

Beas Project Appointment

The Rs170 crore Beas development project, which will be a major item in the third and fourth plans of Punjab and Rajasthan, will be controlled by a 15-member board with autonomous powers giving overall policy control. A separate board of consultants will also be appointed as at Bhakra. The present general manager of Bhakra, Mr M. R. Chopra, will be responsible for the Beas project. Under the third plan, an expenditure of Rs92 lakhs will be allocated for power generation under the project and Rs79 lakhs for the Pong Dam scheme. It has not yet been decided whether a foreign expert will be appointed to the control board.

Nuclear Self-sufficiency

By 1965, when the 300 MW Tarapore nuclear station is completed, India will not need foreign tenders for nuclear stations. This statement was made recently by Dr H. J. Bhabha, chairman of the Atomic Energy Commission. Already, he said, India could build small nuclear stations, although decisions on their location had not yet been taken. A uranium mine was being developed and a processing plant was under consideration. Tenders for the Tarapore station are due for submission by the end of March.

KOREA

Expansion Plans Require Finance

Expansion plans by the Korean Government, extending over seven years, aim at increasing generating capacity from 366 MW to 1,035 MW by 1969. Four new thermal and three hydro plants are envisaged and, although it is reported financing has not been worked out, dependence will be on American DLF loans and foreign long-term credits. The Government awarded contracts for the 100 MW Pusan plant in November to International General Electric and a decision is awaited on whether the same company will supply a 30 MW set at Samchok or whether it will be put out to international tender. An offer to build a 100 MW plant at Samchok was made by Siemens, Germany, in December.

AUSTRALIA

Large Transmission Line Project

Fresh tenders for one stage of a 400-mile transmission line extension are to be called for by the North West County Council, New South Wales, following withdrawal by the original constructor. The extensions, in four stages, are anticipated to cost this year £151,000 and run from Garah, north to the border and from Boomin, in the south west, towards Mungindi. Two of the sections should be finished by the end of 1962. The Boomin-Northern Border Extension, estimated to cost when completed £333,000, is reported to be the largest line undertaken in Australia.

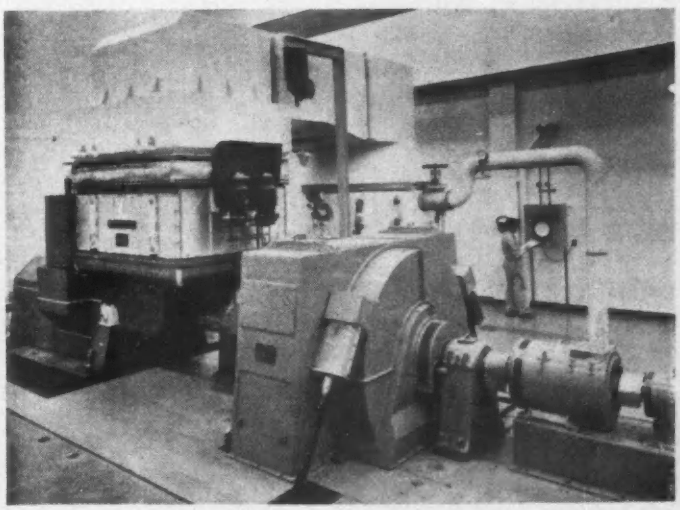
NEW ZEALAND

Cook Strait Cable

The Cook Strait cable, which has received strong support in the recommendations of the Combined Electric Power Planning Committee, now seems almost certain to be installed. The cable will constitute a h.v.d.c. link between the Benmore hydro station on South Island and the North Island system. Two routes are proposed, one, 25 miles long, costing £19 million and the other, 37 miles long, costing £22 million. Representatives of BICC recently flew out to discuss the project, according to a report from Wellington.

ALBERTA BUYS UK TURBINE

Claimed as the first UK gas turbine plant to be installed in Canada, this English Electric 1,850 kW unit has been in operation for some months at Alberta University. It generates for about ten hours per day, supplying local buildings in parallel with the city supply. Special instrumentation enables it to be used by students for practical studies. The turbine uses compressed natural gas from the Edmonton mains and yields 10 klb/hr of low pressure steam in addition to its electrical output. Automatic starting sequence is provided. The gas turbine is a compact, twin combustion chamber machine with an integral plate regenerator. The compressor runs at 8,200 r.p.m. and is driven by a separate two-stage turbine. The alternator is designed to give increased output of 2·2 MW 4·16 kV 60 c/s at low ambient temperatures, when the gas turbine output rises



COMMERCIAL INFORMATION

Contracts Open at Home . . .

Dates given are the final for receipt of tenders unless otherwise stated.

23 Feb.—Down C.C. Electrical installation in Braniel Primary School extensions.—See 16 Feb. issue.

23 Feb.—Ealing B.C. Electrical installation renewal at Drayton Infants' and Perivale Primary Schools.—Advertised 26 Jan. issue.

23 Feb.—Glasgow C.C. Electrical installation including space heating at St. Patrick's Primary School, North St, and one janitor's house. Applications to City Architect and Director of Planning, 20 Trongate, Glasgow C.1, by above date.

23 Feb.—Inverness B.C. Electrical installations in eight blocks of four-storey flats on four sites.—See 16 Feb. issue.

23 Feb.—Southampton C.B.C. Electrical installation renewal in Taunton's School.—Advertised 16 Feb. issue.

24 Feb.—Edinburgh. Electrical maintenance for year at Gogarburn Mental Deficiency Institution.—See 16 Feb. issue.

24 Feb.—Renfrew C.C. (8) Electrical work in Maukinhill Protestant Primary School, Greenock. Applications to County Clerk, R. Urquhart, County Bldgs, Paisley, by above date.

25 Feb.—Argyll C.C. 56 15 ft steel or concrete columns with Class "B" lamps/lanterns/gear at Dunbeg Village.—See 2 Feb. issue.

27 Feb.—Dumfries B.C. Electrical installation in Greensands swimming pool. Applications to Town Clerk: G. D. Grant, Municipal Chmbrs, by above date.

27 Feb.—Flintshire C.C. Eight 30 ft columns with 200 W sodium lighting at A550 Penymynydd Roundabout.—Advertised 16 Feb. issue.

27 Feb.—Pocklington R.D.C. Booster pumps for Market Weighton.—See 9 Feb. issue.

27 Feb.—W. Fife Hospitals. (2a) Electrical maintenance.—See 16 Feb. issue.

28 Feb.—Dewsbury B.C. Supply: Concrete columns, 140 and 200 W sodium, 250 and 400 W m.v. lanterns, tungsten, sodium and m.v. lamps, swan-neck brackets and spigots, control gear, time-switches.—Advertised 9 Feb. issue.

28 Feb.—Hornchurch U.D.C. Erection of 372 Class "A" columns and 697 Class "B" columns plus adaptions.—See 16 Feb. issue.

28 Feb.—Limerick. Electrical installation in new primary school, Ballinacurra Weston. Details from Architect: J. C. Thompson, 65 O'Connell St, Limerick. Deposit £15.

28 Feb.—Mid-Wales Hospitals. Applications invited for inclusion in approved list for electrical works to Group Secretary, 31 North Parade, Aberystwyth, by above date.

28 Feb.—Ross and Cromarty C.C. (g) Electrical installations in: (1) 20 houses, Conon Bridge; (2) ten houses, Kessock; (3) 18 houses, Muir-of-Ord. Applications to Quantity Surveyors: R. Armour and Ptnrs, 375 Union St, Aberdeen, by above date.

1 March—Carshalton U.D.C. 26 15 ft columns for tungsten and two 25 ft columns for 400 W mercury lighting.—See 16 Feb. issue.

1 March—Durham C.C. Electrical installations: (b) Winlaton Mill Village Hall; (b) Swalwell Village Hall: (e) Newton Aycliffe Hostel for Aged Persons: Subdivisional Police H.Q., West Hartlepool. Applications to County Architect, South St, by above date.

1 March—Manchester C.C. Electrical installations: 20 maisonnettes, Wythenshawe; 12 maisonnettes, Ancoats; 28 houses, Ancoats; 14 houses, Langley; nine bungalows, Chorlton-cum-Hardy.—Advertised 16 Feb. issue.

2 March—Belfast C.C. Goods lift installation in Education Dept.—See 2 Feb. issue.

2 March—Pontardawe R.D.C. (a) 27 steel columns, lanterns, lamps and equipment along various roads. (b) Supply of 178 lanterns, lamps, brackets and equipment.—See 16 Feb. issue.

2 March—Reigate B.C. 80 Group "A" steel columns and ancillary equipment.—Advertised 16 Feb. issue.

3 March—Belfast C.C. 33/6·6 kV step-down transformers.—Advertised 2 Feb. issue.

3 March—Braintree and Bocking U.D.C. Electrical installation in The Institute.—Advertised 9 Feb. issue.

3 March—Cardiff C.C. Electrical services reorganisation, Welsh College of Advanced Technology.—See 16 Feb. issue.

3 March—Durham R.D.C. Supply of electrical goods for housing. Surveyor, Byland Lodge, Hawthorn Terr.

3 March—Flintshire C.C. Supply of: vegetable and dual purpose boilers; cooking ranges; steaming ovens; hot cupboards; sterilising sinks; potato peelers; refrigerators and mixing machines for School Meals Service.—See 16 Feb. issue.

3 March—Kirkcudbright C.C. Electrical work in Gatehouse Secondary School alterations.—See 16 Feb. issue.

3 March—Midlothian C.C. Supply: lamps.—See 16 Feb. issue.

3 March—Southport C.B.C. Electrical installation in Floral Hall.—See 9 Feb. issue.

4 March—Barrhead B.C. Rewiring of 292 pre-war houses.—See 9 Feb. issue.

6 March—Beeston and Stapleford U.D.C. Supply and erection of columns, lanterns and auxiliary equipment for 100 units for Trunk Rd A52 lighting. Engineer and Surveyor, Town Hall, Beeston. Deposit £1 1s.

6 March—Caterham and Warlingham U.D.C. Supply of (1) 171 140 W sodium lanterns/lamps/gear and (2) 171 25 ft steel columns/brackets.—See 16 Feb. issue.

6 March—Co. Armagh. Electrical installation in Poultry Testing Station, Stage 2, Gosford Castle estate, Markethill. Ministry of Finance, Room 103, Law Courts Bldg, Belfast 1.

6 March—Downpatrick U.D.C. Electrical installations in 34 houses. Council Clerk, Irish St.

6 March—Lancashire C.C. Supply of: (1) lighting and starting batteries; (2) automobile lamp bulbs; (3) dry batteries and bulbs for year. Chief Fire Officer, Fire Brigade H.Q., Fulwood, Preston.

6 March—Magherafelt. Electrical installation in proposed new voluntary secondary intermediate school.—See 16 Feb. issue.

6 March—Stourbridge B.C. Electrical work in 492 pre-war houses divided into four groups.—See 16 Feb. issue.

6 March—W. Riding C.C. Rewiring Shipley Grag Rd Junior School.—See 9 Feb. issue.

7 March—Dublin C.C. Supply and erection of five pumping units. Details from Consulting Engineers: P. H. McCarthy and Son, 26 Lower Leeson St, Dublin. Deposit £5.

8 March—Bridge-Blean R.D.C. 60 g.p.m. at 64 ft head duplicate sewage pumps, etc., for Chislet scheme.—See 2 Feb. issue.

8 March—Burton-on-Trent C.B.C. Supply of (6) electrical equipment for Residential Home for Aged Persons, Stapenhill Rd. Chief Welfare Services Officer, Town Hall.

8 March—Kilmarnock B.C. Supply: lamps.—See 16 Feb. issue.

8 March—Newport C.B.C. Erection/painting of steel columns and provision of sodium lighting along parts of Somerton and Chepstow roads. Details from Borough Engineer, Civic Centre, on production of Treasurer's receipt for £2 2s deposit.

8 March—Wandsworth B.C. Supply of (1) 63 35 ft steel columns; (2) 126 140 W condensers and transformers, 63 280 W lanterns and time switches. Borough Engineer, Municipal Bldgs, S.W.18.

9 March—Northwich R.D.C. 42 Group "A" concrete columns and 52 140 W sodium lamps/lanterns/gear.—See 16 Feb. issue.

9 March—Sunderland C.B.C. Electrical installation in Monkwearmouth Comprehensive School.—Advertised 16 Feb. issue.

10 March—Sunderland C.B.C. Electrical installations in 277 dwellings, Town End Farm estate.—Advertised 16 Feb. issue.

11 March—Calthness C.C. Electrical work in 123 houses.—See 16 Feb. issue.

13 March—Faversham B.C. Supply and erection: (1) 73 columns/sodium lanterns/equipment; (2) 32 mercury fluorescent lanterns/columns/wall brackets/equipment. Borough Surveyor, Municipal Offices. Deposit £2 2s each contract.

13 March—Stockport B.C. Electrical installation in new ambulance depot, Heaton La.—See 16 Feb. issue.

13 March—Sunderland R.D.C. Supply of electrical goods, fires and cable for 1961 housing and maintenance programme. Surveyor: C. Emmerson, 2 The Esplanade.

14 March—Llanelly R.D.C. Lighting on trunk road, A48: (a) supply and erection

Your Queries Answered

Readers are invited to make use of our free enquiry department which possesses wide resources, including an index of trade information with over 100,000 entries

A Selection from the 115 queries answered this week

"Genalex" electric clocks—makers of? T.E.—The General Electric Co. Ltd., Magnet Hse, Kingsway, W.C.2.

"Tropicaire" hot air systems—makers of? L.E.B.—Tropicaire Ltd., Ashford Rd, Ashford, Middx.

"Eureka" vacuum cleaners—address for spares? E.B.—Eureka Electric Ltd., Cray Ave, St. Mary Cray, Kent.

"Turret" trunking systems—makers of? E.E.W.—The Power Centre Co. Ltd., Lloyds St, Wednesbury, Staffs.

"Skilsaw" portable electric saws—agents for? P.E.—British Equipment Co. Ltd., Ixworth Hse, Ixworth Pl, Kensington, S.W.3.

Paint which changes colour when subjected to excessive temperature—makers of? K. and D.—J. M. Steel and Co. Ltd., Kern Hse, 36 Kingsway, W.C.2.

"Fisher" washing machines—address for spares? B. and B.—Home Electric Washer Co. Ltd., 17 Aylmer Parade Court, North Rd, N.2.

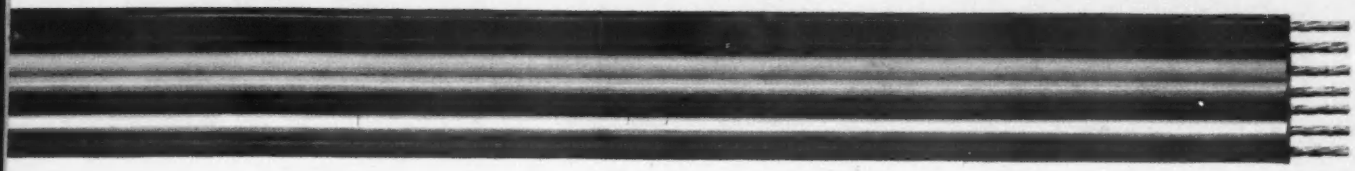
Rowlett Engineering Co. Ltd.—address for? T.E.—Second Cross Rd, Twickenham, Middx.

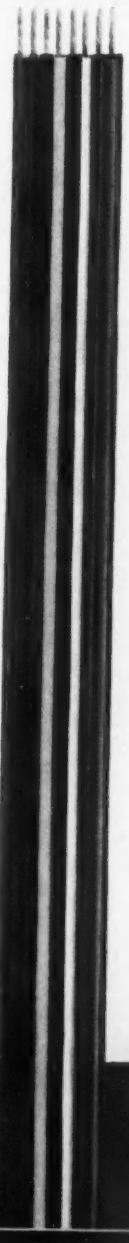
"Defensor" humidifiers—agents for? L.E.B.—Price Service and Co. Ltd., 170 Westminster Bridge Rd, S.E.1.

"Kerson" accessories—address for? F.D.B.—Midland Electric Manufacturing Co. Ltd., Reddings La, Tyseley, Birmingham 11.

Electrical Times, 23 February, 1961

RIBBON CABLES





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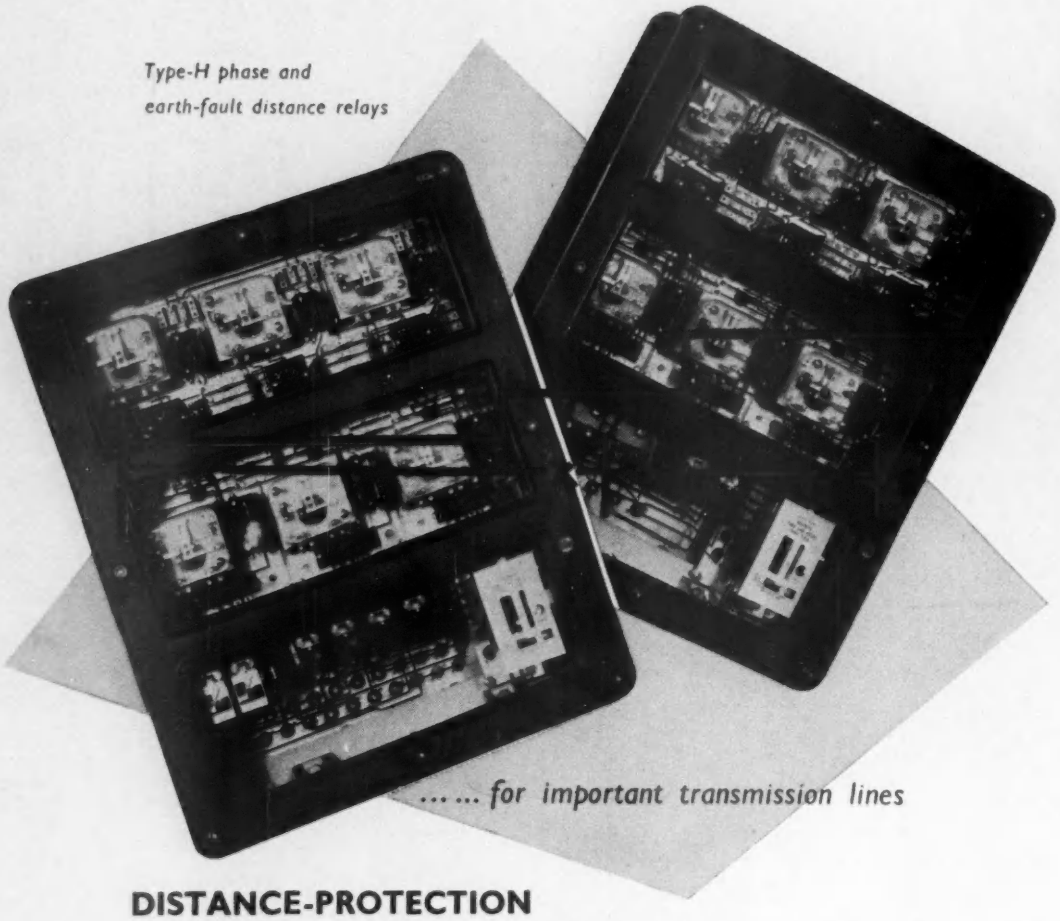

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- Separate moving-coil elements for earth-faults and phase-faults
- All relay-elements identical and easily removable
- Self-contained design reduces panel wiring
- Built-in phase-selectors for single-phase auto-reclosing if required

Ask for Pamphlet 1297

Reyrolle

A. REYROLLE & COMPANY LIMITED - HEBBURN - COUNTY DURHAM - ENGLAND

of 12 steel columns with 140 W sodium discharge lamps; (b) ditto two columns with 85 W lamps; and (c) supply and delivery of 21 140 W sodium discharge lamps. Architect and Surveyor, 2 Queen Victoria Rd, Llanelly. Deposit £2 2s.—Advertised 16 Feb. issue.

17 March—Grimsby C.B.C. (c) Electrical installation in comprehensive school, Ely Rd.—See 16 Feb. issue.

17 March—Westhoughton U.D.C. Supply of lamps for year. Surveyor, Town Hall, Westhoughton, Bolton.

17 March—Wilton B.C. Street lighting installation, Seagrim estate and Burcombe La.—See 16 Feb. issue.

20 March—Londonderry C.C. Supply of heavy equipment for school kitchen at St. Joseph's Intermediate School, Coleraine. Education Office, New Row, Coleraine.

20 March—Nottingham C.C. Centrifugal well pumps, motors, switchgear, etc., for Basford.—See 2 Feb. issue.

20 March—West Riding C.C. (1) Floodlighting of play courts, Swinton Secondary School. Applications, quoting N.I.C.E.I.C. roll no., to County Architect, Bishopgarth, Westfield Rd, Wakefield.

21 March—Armagh. Electrical installation in Convent of the Sacred Heart Grammar School extensions. Details from Architects: McLean and Forte, 37 Malone Rd, Belfast. Deposit £3 3s.

21 March—Bedfordshire C.C. (b) Electrical installation in Clapham/Oakley County Secondary School.—See 19 Jan. issue.

No date stated—Boston Group Hospitals. Applications invited for electrical maintenance work.—See 9 Feb. issue.

No date stated—Herts C.C. Applications invited for inclusion in list for electrical work.—See 2 Feb. issue.

No date stated—N. of Scotland H-E.B. Supply and erection of double-circuit steel tower and two single-circuit wood pole lines for Mybster/Thurso 132 kV and 33 kV at Thurso. Board's Chief Electrical and Mechanical Engineer, 16 Rothesay Terr, Edinburgh 3. Deposit £2 2s.

No date stated—Prestonpans B.C. (8) Electrical installations in six three-apartment houses, Kirk St/Kirk Wynd. Applications to Quantity Surveyors: R. and A. K. Smith, 4 Forres St, Edinburgh 3.

. . . and Overseas

*Details of items marked * may be obtained on application to the Board of Trade, Lacon Hse, Theobalds Rd, W.C.1, quoting reference.*

1 March—Australia. Section 2: two 5,000 A, 11 kV, 3-ph. c.b's for four and five generators; Section 3: 11 kV cables; Section 4: buswork and isolators; Section 5: earthing for Hazelwood Power Station. State Electricity Commission, 22-32 William St, Melbourne. B.o.T. (ESB/5272/61).*

2 March—Portugal. Cabling, transformer and standby diesel stations for airfield. N.A.T.O. Contract value £54,500. Applications to: Comissao Executivada De Infraestrutures Otan (Ceiotan), Secretariado Geral de Defesa Nacional, Rua Cova da Moura 1, Lisbon. B.o.T. (GD.87/61/18).*

3 March—Rhodesia and Nyasaland. 30 600 W chargers. Secretary, Federal Tender Board, P.O. Box 8075, Causeway, Salisbury. B.o.T. (ESB/4531/61).*

3 March—Rhodesia and Nyasaland. Eight domestic washing/spin drying machines, five flat-bed ironers, five rotary ironers. Secretary, Federal Tender Board, P.O. Box 8075, Causeway, Salisbury, B.o.T. (ESB/4535/61).*

4 March—Nigeria. One 200 A six-panel 6·6 kV switchboard. Secretary, E.C. of Nigeria, 13 Broad St, Lagos. B.o.T. (ESB/4584/61).*

6 March—Pakistan. 3,000 yd p.i.l.s.d.s.t.a. 1·1 kV two-core cable. Director-General, Supply and Development, Frere Rd, Karachi. B.o.T. (ESB/5219/61).*

9 March—India. 2 MVA transformers, lightning arresters, group operating switches and 13·2 switchgear. Chief Engineer, Electricity, Mysore State Electricity Board, P.B. 15, Bangalore. B.o.T. (ESB/42992/61).*

11 March—Malaya. Electrical pumping equipment. State Engineer, P.W.D., Johore, Johore Bahru. B.o.T. (ESB/4901/61).*

17 March—Portuguese East Africa. Electrical equipment. Railway warehouse, Ports, Railway and Transport Dept., Lourenco Marques. B.o.T. (ESB/4593/61).*

17 March—S. Africa. Telephone cable, three items. Town Clerk, City Hall, West St, Durban. B.o.T. (ESB/4524/61).*

17 March—Uruguay. Single and three phase meters, current and voltage transformers. Administracion General de las Usinas Electricas y los Telefonos del Estado, Montevideo. B.o.T. (ESB/3868/61).*

21 March—Uruguay. Armoured cable, boxes, terminals, etc., 77 items. Administracion General de las Usinas Electricas y los Telefonos del Estado, Montevideo. B.o.T. (ESB/3866/61).*

23 March—Uruguay. 266 transformers. Administracion General de las Usinas Electricas y los Telefonos del Estado, Montevideo. B.o.T. (ESB/3867/61).*

14 April—Costa Rica. Transmission line equipment including: conductors, insulators, accessories and support structures for Rio Macho/Colima/Uruca and Garita/Barranca schemes. La Proveeduria del Instituto Costarricense de Electricidad, San Jose. B.o.T. (ESB/4933/61).*

24 April—Trinidad and Tobago. (1) S.-ph. two-wire 230 V meters and sockets; (2) bare copper wire; (3) line hardware; (4) fluorescent street lighting equipment; (5) aluminium tie wire; (6) c.t. boxes. Purchasing Officer, Electricity Commission, P.O. Box 121, Port-of-Spain.—Advertised in this issue.

25 April—India. Winding machines, transformers, arc welding sets, varnishing oven, impregnation plant (16 items). Works Manager, Heavy Electricals Ltd., P.B. 46, Bhopal. B.o.T. (ESB/4517/61).*

CONTRACTS PLACED

C.E.G.B. Contracts placed during the past month amounting to £4,289,000 include: Thorpe Marsh power station: circulating water pipework for unit No. 2, Clayton, Son and Co. Ltd.; administration block, workshop and stores superstructure, Mitchell Construction Co. Ltd. Drakelow "C" power station: ash and dust handling plant, units 9-12, Babcock and Wilcox Ltd. Rugeley power station: generator transformers Nos. 4 and 5, Ferranti Ltd. Richborough power station: two 144 MVA, 132 kV generator transformers Nos. 2 and 3, The English Electric Co. Ltd. West Thurrock power station: fire fighting equipment, Mather and Platt Ltd. Grove Road power station: three 30 MVA, 132/6·6 kV and four 15 MVA, 132/11 kV transformers, Johnson and Phillips Ltd. Woodside (Shore Rd) substation: one 45 MVA, 132/33 kVA transformer and earthing transformer, The English Electric Co. Ltd. Upper Boat substation: 132 kV switchgear, Associated Electrical Industries Ltd. Cardiff East substation: 132 kV switchgear, The General Electric Co. Ltd.; two 75 MVA transformers, The English Electric Co. Ltd. Cardiff West substation: 132 kV switchgear, Associated Electrical Industries Ltd. Hackney substation: 66 kV cabling, W. T. Glover and Co. Ltd. Wimbledon substation: 132 kV switchgear, Associated Electrical Industries Ltd. Chessington substation: two 90 MVA, 132/33 kV transformers, Ferranti Ltd. Purley substation: two 90 MVA, 132/33 kV transformers, Associated Electrical Industries Ltd. Holborn substation: 132 kV, 3,500 MVA switchgear, A. Reyrolle and Co. Ltd. Sundon substation: 275 kV, 15,000 MVA switchgear, The English Electric Co. Ltd. Feckenham substation: 275 kV, 15,000 MVA switchgear, English Electric Co. Ltd. Monk Fryston substation: 275 kV and 380 kV isolators and connections, Associated Electrical Industries Ltd. Tinsley Park substation: two 100 MVA, 275/33 kV transformers, English Electric Co. Ltd.: 275 kV isolators and connections, Associated Electrical Industries Ltd.

C.E.G.B. (Eastern, London and S.E. Region). Contracts placed in January, amounting to £797,246, include: Hackney, 66 kV cabling, W. T. Glover. Taylors Lane, 33 kV switchgear mods., A. Reyrolle and Co. Wimbledon, 132 kV switchgear, A.E.I. Chessington, two 90 MVA 132/33 kV transformers, Ferranti Ltd. Leigh, civil works, J. L. Eve Const. Co. Purley, two 90 MVA 132/33 kV transformers, A.E.I. Austin Canons, 33 kV cabling, A.E.I. Aylesbury, 132 kV switchgear, A. Reyrolle and Co. Cliff Quay, 132 kV switchgear exts., A.E.I. Watford, 132 kV switchgear, A. Reyrolle and Co. Watford, 132 kV cabling, Pirelli-General. Wickham Market, site works, W. and C. French Ltd. Barking "C," air heater shot cleaning equipment, Babcock and Wilcox.

Newcastle-on-Tyne Hospital Board. Electrical installations: new dept. of physical medicine, Middlesbrough General Hospital, C. Horne and Co. Ltd., £4,462; and at Berwick Infirmary, James Scott and Co.

Northumberland C.C. Rewiring Doxford Hall, J. Tully, £589 11s.

Stoke Newington B.C. Green Lanes street lighting, General Electric Co., £10,310.

Wandsworth B.C. Electrical modernisation work: 106 Fairfield Drive and Spencer Pk dwellings, Lektrix Installations Ltd., £2,800; 42 Sanders Hse flats, S. White (Streatham) Ltd., £1,360.

Witney R.D.C. Electrical improvements, 50 houses, Eynsham, G. Wheeler, £1,033.

TRADE NOTES

Changes of Address. Cannon Electric (Gt. Britain) Ltd. have moved to 168-172 Old St, E.C.2. Telephone: Clerkenwell 4954. The factory continues at 27 Bickerton Rd, N.19.

As from 28 Feb., Kabi (Electrical and Plastics) Ltd. are closing their Byng Rd offices, and future correspondence should be sent to the works at Cranborne Rd, Potters Bar.

The Association of Public Lighting Engineers has moved to Buckingham Court, 78 Buckingham Gate, S.W.1., but the telephone no. remains Victoria 3655.

BEAMA Contract Price Adjustment Formulae. *For Electrical Machinery and Equipment.* For purposes of calculating variations in (*a*) "Rates of Pay"—the rate of pay for adult male labour at 17 Feb., 1961, shall be deemed to be 213s 6d: (*b*) "Cost of Material"—the index figure for materials used in the Electrical Machinery Industry at 17 Feb., 1961, is 116·6* (180·9*).

For Turbo-Generator and Allied Plant. For purposes of calculating variations in: (*a*) "Rates of Pay"—the rate of pay for adult male labour as at 17 Feb., 1961, shall be deemed to be 213s 6d: (*b*) "Cost of Material"—the index figure for materials used in the Mechanical Engineering Industry at 17 Feb., 1961, is 126·2* (189·6*). "Blast Furnaces and Iron and Steel Melting and Rolling (1948 S.I.C. ref. 4(1)41)." 189·3*. Other Steel Goods, excluding tubes. (1958 S.I.C. ref. 311/2). 129·0*. The price of brass condenser tubes ¾ in. o/d 18 s.w.g. on 17 Feb., 1961, is 4s 1½d per lb. *Provisional figure.

The figures in parentheses shown above relate to earliest list of wholesale price index numbers in which the year 1949 is taken as the base 100. For the other figures 1954=100.

GAZETTE ANNOUNCEMENTS

COMPANIES ACTS

The recent voluntary liquidation of **Engelhard Hanovia Ltd.** announced in our issue of 2 Feb. is merely a part of some internal reorganisation within the Engelhard Group. The day-to-day business of Engelhard Hanovia continues on the same basis as before under the name of Engelhard Hanovia Lamps branch of Engelhard Development Co. of Canada Ltd.

Coicough (Hanley) Ltd. Creditors to send details to liquidator: P. J. Snow, 17 Albion St, Hanley, by 3 March.

G.P.C. Electronics Ltd. Mr B. Shaw, 9 Ormond Cl, Boswell St, W.C.1, appointed liquidator at extraordinary general meeting on 30 Jan. for the purpose of voluntarily winding-up.

R. B. Tapes Co. Ltd. Creditors to send details to liquidator: K. R. Cork, 19 Eastcheap, E.C.3, by 31 March.

Holmes Electrical Ltd. Creditors to send details to liquidator: P. Cardwell, 93 Queen St, Sheffield 1, by 28 Feb.

Cerrig-y-Drudion Electricity Supply Co. Ltd. Mr J. V. Banks, 17 Crescent Rd, Rhyl, appointed liquidator at extraordinary general meeting on 4 Feb. for the purpose of voluntarily winding-up.

Civil Sewing Machine Co. Ltd. First meetings of creditors and contributories to be held at Room 401, Inveresk Hse, 346 Strand, W.C.2, on 23 Feb., at 10.15 and 10.45 a.m., respectively.

Dydeal Ltd. First meetings of creditors and contributories to be held at Room 401, Inveresk Hse, 346 Strand, W.C.2, on 23 Feb., at 11.30 a.m. and 12 noon, respectively.

Arthur Miers and Co. Ltd. Mr A. E. Smith, Regent Chmbrs, Hall Cross, Doncaster, appointed liquidator at extraordinary general meeting on 6 Feb. for the purpose of voluntarily winding-up.

Phillip-Smith Organisation Ltd. Mr S. G. Banister, 15 Golden Sq, W.1, appointed liquidator at extraordinary general meeting on 6 Feb. for the purpose of voluntarily winding-up.

Maypole Electrical Ltd. Winding-up order dated 6 Feb.

Trix Electrical Co. Ltd. Petition for winding-up to be heard before the High Court of Justice, Strand, W.C.2, on 27 Feb. Persons intending to appear to notify Mackrell, Ward and Evans, 6 Fredericks Pl, Old Jewry, E.C.2, by 1 p.m. 25 Feb.

Intercommunications Equipment Ltd. Petition for winding-up to be heard before the Southend County Court, 102 Alexandra Rd, Southend, on 3 March. Persons intending to appear to notify H. J. Jefferies and Co., 37 Alexandra St, Southend-on-Sea, by 6 p.m. 2 March.

Hones Electric Ltd. First meetings of creditors and contributories to be held at Room 401, Inveresk Hse, 346 Strand, W.C.2, on 28 Feb. at 2.30 and 3 p.m., respectively.

A. Barlow and Co. Ltd. Dividend per £: 8½d, payable at 25 Bedford Row, W.C.1, on 1 March.

Partnership Dissolved

Cheshire. Partnership between T. Anderson and J. W. Anderson, electrical and wireless engineers, carrying on business as T. Anderson and Sons at 8 London Rd, Alderley Edge, dissolved as from 30 Sept. The business is being carried on by T. Anderson and Sons Ltd.

BANKRUPTCY ACTS

Receiving Orders

High Court of Justice. H. C. Holloway, radio and electrical engineer, carrying on business at 30 Station Rd, Birmingham 27, and 2 High St, Solihull. Receiving order dated 7 Feb.

Croydon. M. H. Gibson, electrical dealer, carrying on business as Housewives Electrical Aids, 17 Vincent Rd, S.E.18. Receiving order dated 13 Feb.

Walsall. E. E. Berrill, electrical goods and furniture dealer, carrying on business as Erica Furnishers and Electricals at 46A Bradford St. Receiving order dated 13 Feb.

First Meeting and Public Examinations

Liverpool. Cresta Electric Lamp and Eng. Co., electrical engineers, of 108 The Northern Rd, Crosby, Liverpool. Public examination: 2.15 p.m., 18 April, at Court Hse, India Bldgs, Water St, Liverpool 2.

High Court of Justice. F. J. Debens, appliance dealer, of 19 Mount Pleasant Villas, N.4. First meeting: 11.30 a.m., 24 Feb.; and public examination: 11 a.m., 16 March, both at Bankruptcy Bldgs, Carey St, W.C.2.

Edmonton. B. C. Renny, electrical retailer, carrying on business at 209 Baker St, Enfield. First meeting: 12 noon 2 March at 58-61 York Terr, Regent's Pk, N.W.1, and public examination: 10.30 a.m. 27 April at Court Hse, Fore St, N.18.

Appointment of Trustees

Leicester. K. Perkins, radio, electrical and television retailer, carrying on business as K.P. County Electrics at 60-62 rear Leicester Rd, Oadby. Mr R. A. Haigh, Court Chmbrs, Friar La, Leicester, appointed trustee as from 9 Feb.

Pontypridd and Ystradfodwg. W. L. King, electrical apparatus dealer, formerly carrying on business at Central Arcade, Pentrebane St, Caerphilly. Mr S. Chater, 35 Windsor Pl, Cardiff, appointed trustee as from 8 Feb.

Intended Dividend

Nottingham. J. E. Bent, appliance retailer, formerly carrying on business as West End Fridge and Washer Co. at 75 West Parade, Lincoln. Last day for receiving proofs for intended dividend: 28 Feb., to trustee: W. W. Jordan, 27 Regent St, Park Row, Nottingham.

Dividends

Ipswich. L. A. L. Leech, contractor and electrical engineer, formerly carrying on business as T.L. Installation Co. (Norfolk and Suffolk), at 129A Fore St. Dividend per £: 1s 7d, payable at 58-61 York Terr, Regent's Pk, N.W.1, on 28 Feb.

Southampton. J. R. Woods, domestic appliance retailer, formerly carrying on business as Homelectrics at 3 St. Mary's Rd. Dividend per £: 2¼d, payable at Official Receiver's Office, 16 Westwood Rd, Southampton, on 28 Feb.

NEW COMPANIES

Extracted from the Register issued by Jordan and Sons Ltd., 116 Chancery La, W.C.2.

Blakes (Dartford) Ltd., 9 Marcus Rd, Dartford, Kent. Electrical and mechanical engineers, etc. Nom. cap.: £100. Dirs.: Kenneth W. Blake and Mrs Elizabeth B. Blake.

Bridge Electronics and Industrial Supplies Ltd., 32 Oakley Gdns, S.W.3. Nom. cap.: £100. Permanent dirs.: John F. Hyde, Anthony F. Joyce and Alethea Townley.

F. E. D. Brundish and Co. Ltd., 3 Grosvenor Rd, Ilford. Manufacturers of radio, electrical and mechanical apparatus, etc. Nom. cap.: £100. Dirs.: Francis E. D. Brundish and Winifred J. Brundish.

Coutant Electronics (Engineering) Ltd., 61-62 Victoria Rd, Surbiton. Nom. cap.: £100. Dirs.: Wm. G. Hall, Sydney M. Foster, C. G. Bailey and W. E. Gilbert.

D. Leyland Ltd., 68-70 Loughborough Rd, S.W.9. Manufacturers of and dealers in electrical goods of all kinds, etc. Nom. cap.: £5,000. Dirs.: Thomas Leyland and Doris Leyland.

Ralph J. Lowe Ltd., 308 Kew Rd, Kew, Surrey. To take over business of electrical contractors carried on at Kew, Richmond, Surrey, by Ralph J. and Adrian R. Lowe, etc. Nom. cap.: £500. Permanent dirs.: Ralph J. Lowe and Adrian R. Lowe.

K. Mills Ltd., Room 26, 154 Bishopsgate, E.C.2. Electrical goods manufacturers and dealers, etc. Nom. cap.: £100. Dirs.: Kenneth Mills, Louise M. Mills and Mary A. Stevens.

Northmore and Partners (H.F. Consultants) Ltd., Victoria Bldgs, Deansgate, Manchester 3. To provide a consultancy service in electrical engineering, etc. Nom. cap.: £1,000. Dirs.: Raymond Northmore, Mrs Beryl J. Northmore and Colin Mead.

S. S. and L. Rosen Ltd., 133 Park Rd, Liverpool 8. To acquire the credit trading businesses of (1) S. Rosen at Room 3, 2 Hatton Gdns, Liverpool; and (2) Rosen Bros., carried on at 153 Park Rd, Liverpool: to carry on business of dealers in electrical goods, furniture, etc. Nom. cap.: £3,000. Dirs.: Samuel Rosen, Simon Rosen and Leon Rosen.

David Rush Ltd., Norman Cottage, Marshchapel, Grimsby. Electronic and automation engineers, etc. Nom. cap.: £100. Dirs.: David Rush and Margaret C. Rush.

Sterad Ltd., 33 Boozer Pit, Merriott, Som. Manufacturers of and dealers in mechanical, electrical and electronic apparatus, etc. Nom. cap.: £500. Dirs.: Jas. H. V. Stephens, Mary H. Stephens and Victor Stephens.

Technirep (Electrical) Ltd., 70 Victoria St, St. Albans, Herts. Nom. cap.: £100. Dirs.: Ernest J. Statham, Frank T. Attard and Mrs Betty Statham.

Watton Electronics Ltd., 202 Green Lanes, N.13. Nom. cap.: £1,000. Dirs.: Percy A. A. Beetlestone and Royal A. Camp.

Windmill Electric Ltd., 68 St. Augustines St, Norwich. To take over the business carried on as "Windmill Electrics" at Norwich, etc. Nom. cap.: £3,000. Dirs.: Roy S. Windmill, Ralph H. Spillings and Victor C. Bush.

TRADE MARKS

This information is extracted from the Official Journal by permission of the Controller.

Alux. 777,403. Class 11. Lamps and lighting installations, etc. Veritys (Maxlume) Ltd., Hazelwell Wks, Fordhouse La, Stirchley, Birmingham 30.

Bossons. B803,803. Class 11. Lamps and fittings, etc. W. H. Bossons Ltd., Brook Mills, Congleton, Cheshire.

C in design. 799,745. Class 7. Motors, generators, etc. 799,747. Class 11. Lighting fittings, cookers, toasters, refrigerators, etc. Allmanna Svenska Elektriska Aktiebolaget, Vasteras, Sweden.

Cresta. B802,504. Class 11. Lamps, etc. Ascot Lamps and Lighting Ltd., Arcola St, E.8.

Indesa. 799,285. Class 7. Clothes and dish-washing machines. 799,286. Class 11. Refrigerators and air conditioners. Indes Ind. Elettrodomestici Societa Per Azioni, 68 Via Spalato, Turin, Italy.

McClary-Easy. B805,003. Class 7. Washing and drying machines. General Steel Wares Ltd., 199 River St, Toronto, Ontario, Canada.

Motabat. B805,147. Class 9. Batteries and accumulators. etc. Motor Replacements Ltd., Lindsay St, Kettering, Northamptonshire.

Philips in design. 796,507. Class 15. Electrical musical instruments, etc. Philips Electrical Ltd., Century Hse, Shaftesbury Ave, W.C.2.

Safari. 812,022. Class 8. Electric shavers, etc. Kent Kordless Ltd., 106 Edmund St, Birmingham 3.

BUSINESS PROSPECTS

Aberdeen T.C. Tender: Comprehensive redevelopment section 2: erection of 75 maisonnettes in multi-storey block. Architects, 11 Broad St, Aberdeen.

Addlestone. Tomie and Maxwell, 24 Dean St, W.1, architects for R.C. Authorities proposed £50,000 new St. Anne's primary school.

Amble. A. B. Walton, The Wynd, Amble, plans rebuilding of Amble Coachworks.

Ascot. Windsor Hospital Management Comm. plan Heatherwood Hospital emergency maternity unit.

Billinge. Wigan and Leigh Hospital Management Comm., plan new Billinge Hospital maternity block.

Birmingham. D. I. Stone (Gowns), 100 Moor St, Birmingham 4, plans lease of site at Vaughan St South.—W. O. Lewis (Badges), 37 Howard St, Birmingham 19, plan lease of site at Mott St.

Bletchley. Milne and Underhill, 103 South End Rd, Hampstead, N.W.3, architects for Pergamon Press Ltd. new printing wks.

Bolton. Kay and Co., Blackhorse St, Bolton, plan brass foundry of Garside Rd.

Bournemouth. C. A. Sinclair, 19b Wolverton Rd, Bournemouth, plan factory premises at Wallisdown Rd.

Bracknell. E. G. V. Hives and Son, 46 Queen's Rd, Reading, architects for Racol Engineering's £150,000 factory at Bracknell New Town Hall.—B. C. Douglas, of Bracknell Development Corpn, Farley Hall, Binfield, quantity surveyor for Mac Fisheries' new headquarters building.

Breconshire C.C. Tender: two schoolhouses, Gwernyfed Secondary Modern School, Three Cocks. Architect, Rhyd Offices, Brecon.

Bromley B.C. Tender: Southborough Branch Library. Engineer.

Caernarvon B.C. Tender: 84 housing units Ty Gwyn estate. Architects, J. Isgoed Williams, Pant-yr-Afon, Penmaenmawr.

Canterbury. Sir John Burnet, Tait, Wilson and Ptnrs, 9 Gower St, W.C.1, architects for £300,000 departmental store for Ricemans Ltd., High St, Deal, Kent.

Cardiff T.C. Tender: 224 dwellings and conversion of 46 Hamilton St, Canton, in six contracts. Architect's Dept.—Guest, Keen and Nettlefold, Castle Wks, plan 500,000 sq ft approved development on land at former Pengam Airport.

Cheltenham. Neata Products (Cheltenham), Mead Rd, Leckhampton, plan 15,000 sq ft building at Churchill Rd.

Chester T.C. Tender: 152 houses and flats, Blacon Camp site housing development. Engineer and Surveyor.

Coleraine R.D.C. Tender: 38 houses, Windy Hall. Architects, W. and M. Given, Waterside, Coleraine, Londonderry.

Coventry. Education Comm. to include residential hostel for 200 students in building programme.—College of Art proposed at rear of Lancester College of Technology.

Cumberland E.C. Tender: stage 2 of Distington Infants' School. Architect: D. W. Dickenson, 15 Portland Sq, Carlisle.

Dalkeith. Fairbrother, Hall and Hedges, 27 Rutland Sq, Edinburgh 1, architects for Ferranti's £150,000 Thorniebank factory.

Dublin. Three hotels at Dublin, Cork and Limerick, planned by Irish-American, Irish and Intercontinental Hotels, to cost £2,500,000.

Eastbourne B.C. Tender: alterations and additions to Chalk Farm Hse, Willingdon. Documents from Strutt and Parker, Lofts and Warner, 201 High St, Lewes.

Edinburgh. Dean of Guild Court granted permission to Nuclear Enterprises (Great Britain), Bankhead Medway, Edinburgh 11, for factory and offices at £55,000.

Enfield B.C. Tender: Nine flats, seven maisonnettes, etc., Baker St. Engineer and Surveyor.—Tender: Extensions and alterations to Durants Special School. Engineer and Surveyor.

Exmouth U.D.C. Tender: 40 old peoples' bungalows, Nutbrook and Burnside site, Withycombe Village. Engineer and Surveyor. —Tender: 14 houses, Nutbrook and Burnside site. Engineer and Surveyor.

Gateshead. Clarance Solomon, 30 St. Mary's Pl, Newcastle, architect for Jew boarding school, at Gladstone Terr.

Gatwick Airport. British United Airways, 35 Piccadilly, W.1, plan extensions. Architects: Clive Pascall and P. Watson, 24 Half Moon St, W.1.

Gipping R.D.C. Tender: 22 bungalows on The Causeway, Needham Market area land. Engineer, Needham Market.

Grangemouth. Tender: 54 three-storey flats, Abbotsgrange. Secretary, Scottish Special Housing Association, 19 Palmerston Pl, Edinburgh 12.

Grimsby B.C. Tender: Ely Rd Comprehensive School.

Halifax. Leeds Regional Hospital Board, Harrogate, plan £41,000 improvements at St. John's Hospital.

Hemel Hempstead. Clive Pascall and Peter Watson, 24 Half Moon St, W.1, architects for Honeywell Controls' Eton Rd offices and canteen.

Holland C.C. Tender: Two-form entry Secondary Modern School for 270 pupils at Crowland, Lincs. Architect, Boston.

Huntingdonshire C.C. Tender: alterations and additions for new kitchen and dining room at Shortsands Home for Aged, St. Neots, for Welfare Committee. Architect.

Isle of Wight C.C. Tender: extensions to Newport Primary Secondary Boys' School. Architect.

Keighley B.C. Tender: Riddlesden Infants' School; enlargement of hall and additional classrooms, etc., Braithwaite E.S.N. School; new kitchen, Highfield Secondary School. Architect.

Leatherhead. Unilever, Unilever Hse, Blackfriars, E.C.4, plan large research centre on 84-acre Downside estate site.

Lincoln T.C. Tender: Branch Library, Clinic and Boiler Hse, Ermine Estate. Architect.

Lindsey C.C. Tender: County primary school of 7,600 sq ft at Healing. Architect, Lincoln.

London. Durrant Westmore and Reeves, 121 Cheapside, E.C.2, architects for new warehouses, at 58 Gt. Eastern St, E.C.1.—Education Comm. plans £472,170 for new buildings at Woolwich Day College.—Victory Heal and Ptnrs, 14 Gray's Inn Sq, W.C.1, architects for six-storey office building, E.C.—R. J. Wood and Ptnrs, Widmore Rd, Bromley, Kent, architects for basement, ground and six upper floors building, site of St. Swithin's Church, Cannon St, E.C.—Trehearn and Norman Preston and Ptnrs, 38 Kingsway, W.C.2, architects for shops and offices, Ludgate Hill, Ave Maria La, Stationers Hall Court.—B. Gold and Ptnrs, 4-6 Savile Row, W.1, architects for 19-storey office block with shops, public-house, restaurant, etc., Wood St, London Wall.—Kenneth Lindy, Joseph Hill and Ptnrs, 24 St. Mary Axe, E.C.3, architects for Yorkwin Investments' six-storey office building.—Daniel Watney, Eiloart, Inman and Nunn, The Charterhouse, Charterhouse Sq, E.C.1, architects for block of shops and offices and new church on Trinity Church site, Hampstead High St, N.W.—W. S. Hattrell and Ptnrs, 21 Cleveland Pl, S.W.1, architects for Boulton and Paul's Stanhope Gate, W.1, office block.—E.C. approves plans for Managers of St. Edward's R.C. School, St. Marylebone, for new block to cost £45,620. E.C. plans replacement of Chesterton primary school, Battersea North, for 560 pupils, at £136,428.

Macclesfield. Imperial Chemical Industries, Millbank, S.W.1, plan factory at Hurdsfield industrial estate, for their Pharmaceuticals Division. Cost £4 million.

Machynlleth U.D.C. Tender: 31 dwellings, Tregarth. Clerk and Chief Financial Officer, Cambrian Hse, Machynlleth.

Manchester T.C. Tender: Alterations and extensions to Grange St Primary School, Bradford. Architect.

Mansfield. Whiteley Electrical Radio Co. plan factory extensions at Victoria St.

Margate T.C. Scheme to provide improved street lighting to cost £59,500.

Middlesbrough B.C. Tender: Two-storey aged persons' hostel for 44 residents, Marton Rd. Clerk.—Tender: Health Centre, Berwick Hills. Clerk.

Milford Haven. Milford Haven Industrial Development, 346 Kilburn High Rd, N.W.6, plan development of parts 1, 2 and 3 of Cromwell Rd industrial estate.

Musselburgh T.C. Tender: three-storey block of 19 houses, Newbigging and Inveresk Rd. Quantity surveyors: Phillips, Knox and Arthur, 35 Manor Pl, Edinburgh 3.

Plymouth T.C. Tender: 84 flats, Ker St, Devonport; residential nursery comprising three homes, nursery and playroom at Mutley Hse. Architect.

Pontardawe R.D.C. Tender: 26 Plas Rd, Rhos, dwellings. Clerk.

Portsmouth. Vigers and Co., 4 Fredericks Pl, Old Jewry, E.C.2, architects for extensions for Grosvenor Press Ltd.

Poulton-le-Fylde. Premier Footwear (Fleetwood) Ltd., Dock St, Fleetwood, plan £100,000 factory at Garstang Rd East.

Prestwick. Scottish Advisory Council for Civil Aviation announces commencement in spring of £1 million air terminal.

Rochdale. John Holroyd and Co., Milnrow, plan works extensions.

Rotherham. Tarslag Ltd., Upper Wortley Rd, plan works and staff canteen.

Scunthorpe. S. N. Cooke and Ptnrs, 34 Harborne Rd, Edgbaston, Birmingham 15, architects for Metal Box Co's factory.

Seaton Valley. M. I. Liddell and Sons, Gt. North Rd, Newcastle, plan development of industrial estate on 10-acre Shiremoor site.

Shrewsbury. Birmingham Regional Hospital Board approves £½ million development of Copthorne Hospital. New maternity unit proposed.

South Shields. M. and H. Gatoff, Newcastle, architects for Go-Gay Shoes' factory extensions at Maxwell St.—R. Collins, South Shields, architect for Rapide's West Holborn factory extensions.—G. H. Gray and Ptnrs, 50 Camden St, North Shields, architects for Fry's Die Casting Bede Trading Estate factory extensions.

Stretford. B.I.C.C. (Submarine Cables), plan Trafford Park Rd factory extensions.

Sunderland. Steel and Co., Crown Engineering Wks, Sunderland, plan research centre for process plant.

Surbiton. S. Griffith and Ptnrs, 29 Greycoat St, S.W.1, quantity surveyors for £400,000 laboratory buildings planned by Decca Radar Ltd., 9 Albert Embankment, S.E.11.

Sutton Coldfield. Birmingham Hospital Board, Edgbaston, Birmingham, plan £466,250 out-patients' department, casualty block and administrative accommodation, at Good Hope Hospital.

Teddington. Ministry of Works (Architects' Dept.), Abell Hse, John Islip St, S.W.1, plan four-storey basic physics build-at £300,000, Teddington National Physical Laboratory.

Thetford. Tooley and Youngs, Stalham, Norfolk, contractors for third set of unit factories on the industrial estate for B.C.

Thorne. K. Scott and Ptnrs, 29 Oswald Rd, Scunthorpe, architects for Sandtoft Tileries' new Sandtoft Airfield factory. Cost £60,000.

Walton-on-Thames. O. E. Parratt, Adelaide Hse, London Bridge, E.C.4, quantity surveyors for Birds Eye Foods' new offices.

Business Prospects—Continued

Watford B.C. Tender: 52 houses and garages on Meriden Estate. Engineer and Surveyor.—S. Peach and Ptnrs, 28 Eccleston Sq, W.C.1, architects for Sun Printers' £40,000 extensions.

Wednesbury. Bridge Foundry Co. plan laboratories, X-ray rooms, toilets, etc., at Bridge St.—A.E.I., 33 Grosvenor Pl, S.W.1, plan rebuilding of offices with canteen, stores, etc., at Smith Rd.

Wellingborough. Whitworth Holdings, Little Irchester, Wellingborough, plan Higham Rd industrial development.

Westbury. Associated Portland Cement Manufacturers, Portland Hse, Tothill St, S.W.1, plan £4 million cement wks.

Wick. K. McRae, 4 Scalesburn Rd, Wick, contractors for Industrial Estates Management Corp.'s glassware factory.

Windsor. N.W. Metropolitan Hospital Board, Eastbourne Terr, W.2, plan £195,000 out-patient, casualty and X-ray departments, at King Edward VII Hospital.

Worcester. Birmingham Hospital Board plan casualty department with offices and stores at rear of Royal Infirmary, £120,000.

MEETINGS TO NOTE

THURSDAY, 23 FEB.

I.E.E. Annual dinner. Grosvenor Hse, Park La, W.1. 7.30 p.m.

I.E.E. (E. Midlands). "Design of a Defensive Guided Missile," J. A. Robinson. (Joint meeting with the Institution of Mechanical Engineers.) Lecture Theatre, Portland Bldg, Nottingham University. 6.30 p.m.

I.E.E. (Western Utilisation Group). "The Development of the Magnetic Particle Clutch Including Reference to its Industrial and Automotive Applications," E. G. Barratt. S. Wales Electricty Board Demonstration Theatre, Kingsway, Swansea. 6 p.m.

SOCIETY OF INSTRUMENT TECHNOLOGY (Chester). "The Atomic Clock," J. V. L. Parry. Lecture Theatre, Admin. Bldg, The Associated Ethyl Co. Ltd., Oil Sites Rd, Ellesmere Port, Wirral. 7 p.m.

I.E.S. (Leicester). "Basis of Recommended Illumination Levels in Britain and the U.S.A.", A. W. Marsden. Demonstration Theatre, E.M.E.B., Charles St. 6.15 p.m.

A.S.E.E. (S. London). "Transistors." Greyhound Hotel, High St, Croydon. 8 p.m.

A.S.E.E. (N. Ireland). "The Transistor—Principles of Operation, Manufacture and Applications," F. Szekely. Central Hall, Rosemary St, Belfast.

FRIDAY, 24 FEB.

I.E.E. (N.E. Graduates and Students). "Some Aspects of the Control and Guidance of Guided Weapons," J. A. Miller. Grey Hall, King's College, Newcastle upon Tyne. 6.30 p.m.

SOCIETY OF INSTRUMENT TECHNOLOGY (Scottish). "Interesting the Instrument Mechanic in Fundamental Principles," F. Rout. Building Centre, Sauchiehall St, Glasgow. 7.15 p.m.

A.S.E.E. (Newcastle upon Tyne and District). Annual dinner. County Hotel.

A.S.E.E. (S.W. London). Annual dinner. Prince of Wales Hotel, S.W.19.

MONDAY, 27 FEB.

I.E.E. (S. Midlands Electronics and Measurement Group). "Electronics in Medicine," P. R. Styles. James Watt Memorial Institute, Birmingham. 6 p.m.

I.E.E. (N. Eastern). "A General Theory of Depreciation of Engineering Plant," D. Rudd. Neville Hall, Newcastle upon Tyne. 6.30 p.m.

I.E.E. (Western Utilisation Group). "The Organisation of Industrial Electrical Maintenance," S. R. Phelps. S.W.E.B. Demonstration Theatre, The Centre, Bristol. 6 p.m.

I.E.E. (Hatfield). "Magnetic Properties of Thin Films for Computing Devices," E. M. Bradley. Hatfield Technical College. 7 p.m.

I.E.S. (Birmingham). A.G.M. and "Plastics for Lighting," W. E. Harper; "Glass for Lighting," J. G. Holmes. Regent Hse, St. Phillips Pl, Colmore Row. 6 p.m.

INSTITUTION OF PLANT ENGINEERS (W. and E. Yorks). "Fuel Economy and Productivity," K. Higginson. Houldsworth School of Applied Science, Leeds University. 7.30 p.m.

INSTITUTION OF PRODUCTION ENGINEERS (N. Midlands). "Numerical Analogue Control of Machine Tools," O. S. Puckle. Louis Room, St. James's Restaurant, Derby. 7 p.m.

ELECTRICAL ASSOCIATION FOR WOMEN. Caroline Haslet Trust Lecture: "Women Engineers in the U.S.S.R.," Miss L. S. Souter and Miss R. Winslade. Institution of Electrical Engineers, Savoy Pl. 6 p.m.

TUESDAY, 28 FEB.

I.E.E. (S. Midlands). Faraday Lecture: "Transistors and All That," L. J. Davies. Town Hall, Birmingham. 7 p.m.

I.E.E. (N.W. Supply Group). "The Protection of High-Voltage Insulators From Power Arc Damage," A. E. Guile. Engineers' Club, Manchester. 6.15 p.m.

INSTITUTION OF PLANT ENGINEERS (S. Wales). "Industrial Lighting," R. S. Hazell. S. Wales Engineers' Institute, Park Pl, Cardiff. 7.30 p.m.

SOCIETY OF INSTRUMENT TECHNOLOGY. "Three Terminal Bridge Measurements and Automation," Dr V. S. Griffiths, Manson Hse, 26 Portland Pl, W.1. 7 p.m.

I.E.S. Sixth Trotter Paterson Memorial Lecture: "Long-range Weather Forecasting." Sir Graham Sutton Royal Institution, Albemarle St, W.1. 6 p.m.

I.E.E. (N. Staffs Graduates and Students). "Transformers—Steel, Copper and Cardboard," D. J. Aylott. Dunstan Hall, Stafford. 7.30 p.m.

INSTITUTION OF MECHANICAL ENGINEERS (Steam Group). "The Advantages of Increased Pressures and Temperatures and Ratings of Large Steam Power Plant." Birdcage Walk, S.W.1. 6 p.m.

I.E.E. (Southern Graduates and Students). "Radio Telescopes," B. R. Cox. Portsmouth College of Technology. 6.30 p.m.

ELECTRICAL ASSOCIATION FOR WOMEN. A.G.M. at Ulster Room, Overseas Hse, St. James's St, S.W.1, at 11 a.m., followed by lunch at 12.30 p.m.

ELECTRICAL DEVELOPMENT ASSOCIATION. Conference and Exhibition at Harrogate until 3 March.

WEDNESDAY, 1 MARCH

I.E.E. and R.Ae.S. (London Joint Group). Discussion: "The Training of 'Electrical' and 'Electronics' Engineers for the Aircraft Industry." Royal Aeronautical Society, 4 Hamilton Pl, W.1. 6 p.m.

I.E.E. (Rugby). "Fundamental Particles," Professor Abdus Salam. Rugby College of Engineering Technology. 6.30 p.m.

I.E.E. (Southern). "Public Electricity Supply—Its Past and Likely Future Development," A. C. Thirtle. S.E.E.B. Offices, Hove. 6.30 p.m.

I.E.E. (Tees-side). "The Application of Electronics to the Electricity Supply Industry," J. S. Forrest. Cleveland Scientific and Technical Institution, Middlesbrough. 6.30 p.m.

I.E.E. (N.E. Graduates and Students). "Some Aspects of the Control and Guidance of Guided Weapons," J. A. Miller. Carlisle Technical College. 7 p.m.

I.E.E. (N. Midlands Graduates and Students). "Space Heating," A. Shorrock. Strafford Arms Hotel, Wakefield. 7 p.m.

SOCIETY OF INSTRUMENT TECHNOLOGY (S. Yorkshire). "High Speed Instruments for Combustion Research," A. E. Pengelly. Metropole Hotel, Leeds. 7 p.m.

I.E.S. (Edinburgh). "25 Years of Stage Lighting," F. P. Bentham. Y.M.C.A. Social Room, 14 South St. Andrew's St. 6.15 p.m.

I.E.S. (Newcastle). "Lighting and Other Things in Moscow and Leningrad," A. G. Penny. Room B7, The Percy Bldg, King's College, Queen Victoria Rd. 6.15 p.m.

I.E.S. (Swansea). "Floodlighting." Demonstration Theatre, S.W.E.B., Kingsway, Swansea. 6 p.m.

NORFOLK ELECTRICAL CIRCLE. Annual dinner/dance at Norwood Rooms, Norwich.

A.S.E.E. (Preston). "High-quality Sound Reproduction," J. Metcalfe. R.A.F.A. Club, East View, Preston. 7.30 p.m.

A.S.E.E. (Halifax). "Prismatic Lighting Equipment," K. Marshall. The Crown Hotel, Horton St. 7.45 p.m.

INSTITUTION OF MECHANICAL ENGINEERS. Symposium on User Experience of Large Scale Industrial Vacuum Plant. Birdcage Walk, S.W.1. 6 p.m.

INCORPORATED SALES MANAGERS' ASSOCIATION. "Case Against Retail Price Maintenance." Professor B. S. Yamey. Caxton Hall, St. James's, S.W.1. 6.30 p.m.

BRITISH INSTITUTION OF RADIO ENGINEERS (Television Group). Inaugural address, L. H. Bedford. London School of Hygiene and Tropical Medicine, Keppel St, Gower St, W.C.1. 5.30 p.m.

THURSDAY, 2 MARCH

I.E.E. "The Place of Formal Study in the Post-Graduate Training of an Electrical Engineer," N. N. Hancock and P. L. Taylor. Savoy Pl, W.C.2. 5.30 p.m.

I.E.E. (Cambridge Electronics and Measurement Group). "Engineering and the Brain," R. L. Gregory. Cavendish Laboratory, Cambridge. 8 p.m.

I.E.E. (E. Midlands). "Transistors and All That," L. J. Davies. De Montfort Hall, Leicester. 7.15 p.m.

I.E.E. (Cardiff Graduates and Students). "Electrical Engineering Requirements in the Modern Steel Rolling Industry," J. L. Brace. Glamorgan College of Technology, Treforest. 7 p.m.

CHELMSFORD ENGINEERING SOCIETY. "Land Drainage and Sea Defence Works of the Essex River Board," E. L. Snell. Hoffmann's Social Hall. 7.30 p.m.

I.E.S. (Glasgow). "27 Years of Stage Lighting," F. P. Bentham. A.G.M. British Lighting Council. 29 St. Vincent Pl. 6.30 p.m.

A.S.E.E. (Brighton, Hove and District). "Electrical Interlocking with the Aid of Radio Isotopes," F. J. Burridge. New Imperial Hotel, First Ave, Hove. 7.30 p.m.

A.S.E.E. (Southampton). "The Manufacture and Applications of Transistors," E. Wolfendale. Polygon Hotel. 7.30 p.m.

BRITISH INSTITUTION OF RADIO ENGINEERS (N. Western). "Some Typical Uses for Electronic Data Processing Systems," C. W. Blaxter. Reynolds Hall, College of Technology, Manchester. 7 p.m.

FRIDAY, 3 MARCH

I.E.E. (Medical Electronics Group). Discussion: "The Clinical Value of E.E.G. Recording" and "Present Trends in General Purpose E.E.G. Recorders." Savoy Pl, W.C.2. 6 p.m.

I.E.E. (N. Midlands). Annual dinner-dance. Cairn Hydro Hotel, Harrogate. 7 p.m.

I.E.E. (S.E. Scotland). "Blaenau Ffestiniog and other Medium-Head Pumped Storage Schemes in Great Britain," H. Headland. (Joint meeting with the Scottish Branch of the Institution of Mechanical Engineers.) North British Hotel, Edinburgh. 6.30 p.m.

I.E.E. (N. Eastern). "Measured and Electrical Model Characteristics of Buildings Heated by Floor Thermal Storage," E. D. Taylor, B. Berger and G. Blaylock. Carlisle Technical College. 7 p.m.

BIRMINGHAM ELECTRIC CLUB. Ladies' Evening. Grosvenor Suite, Grand Hotel. 7.30 p.m.

I.E.S. (Edinburgh). Annual supper and dance. Carlton Hotel.

I.E.S. (Nottingham). Ladies' Evening. George Hotel.

MONDAY, 6 MARCH

I.E.E. (Electronics and Communications Section). "An Investigation of the Usefulness of Back-Scatter Sounding in the Operation of H.F. Broadcasting Services," E. D. R. Shearman. Savoy Pl, W.C.2. 5.30 p.m.

I.E.E. (Maidstone). "Safety in the Utilisation of Electricity," S. J. Emerson. Maidstone Technical College. 7 p.m.

I.E.E. (Western). "Short-Circuit Ratings for Mains Cables," G. S. Buckingham; and "A Basis for Short-Circuit Ratings for Paper Insulated Cables up to 11 kV," L. Gosland and R. G. Parr. M.E.B. Sub-Area H.Q., Gloucester. 6 p.m.

I.E.E. (N. Staffs). "The Future of 'Electrics' and 'Electronics' in Aircraft and Guided Missiles," The Rt Hon The Viscount Caldecote. English Electric Co., Kidsgrove. 7 p.m.

I.E.E. (S. Midlands). Discussion: "This House Deplores the Present Rate of World Expenditure on Space Research, While Many Problems of Extreme Poverty and Sickness Still Exist on an International Scale." (Joint meeting with Graduates and Students.) James Watt Memorial Institute, Birmingham. 6.30 p.m.

N.E. ELECTRICAL CLUB. "Infra-red Gas Analysis," A. E. Martin. County Hotel, Neville St, Newcastle upon Tyne. 6.30 p.m.

I.E.E. (N.E. Measurement and Electronics Group). "Applications of Microwaves," Professor A. L. Cullen. Rutherford College of Technology, Northumberland Rd, Newcastle upon Tyne. 6.15 p.m.

TUESDAY, 7 MARCH

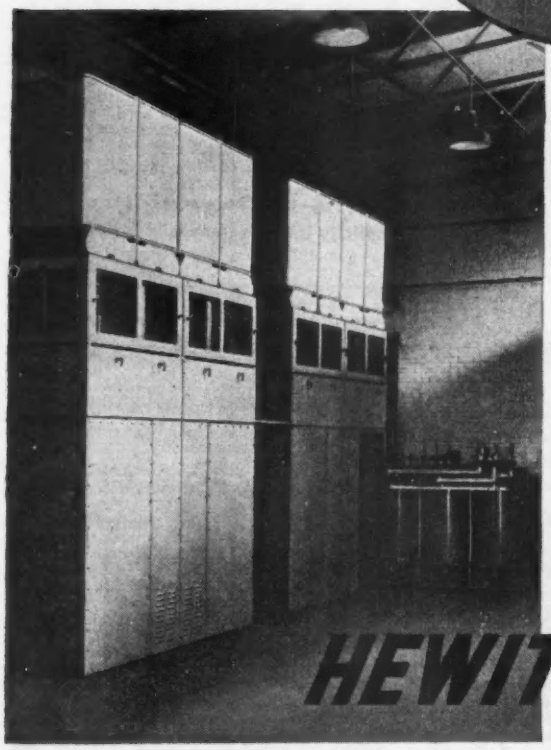
I.E.E. (Measurement and Control Section). "The Automatic Control of Machines for Assembling Mechanical Components," A. V. Hemingway and R. L. Dressler. Savoy Pl, W.C.2. 5.30 p.m.

I.E.E. (N.W. Utilisation Group). "Electricity Generation and Transmission for a Group of Chemical Works," F. H. Merrill. Engineers' Club, Albert Sq, Manchester. 6.15 p.m.

I.E.E. (N. Eastern). "Measured and Electrical Model Characteristics of Buildings Heated by Floor Thermal Storage," E. D. Taylor, B. Berger and G. Blaylock. Workington College of Further Education. 7 p.m.

I.E.E. (S.E. Scotland). "An Oscillating Synchronous Linear Machine," E. R. Laithwaite and R. S. Mamak. Carlton Hotel, Edinburgh. 7 p.m.

I.E.E. (Southern Graduates and Students). "D.C. Amplifiers," H. Kemhadjian. Farnborough Technical College. 6.30 p.m.



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The photograph, left, shows two 1,500 kW equipments. One of the two main transformers in the farther set is withdrawn to show its location.

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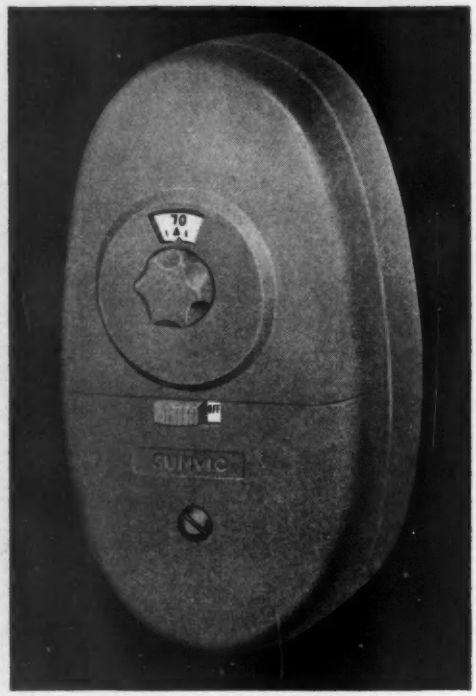

the Sunvic Room thermostat — designed for two people

THE HOUSEHOLDER

The householder, for its life long reliability and dust free, cleanline appearance.

THE CONTRACTOR

For you — the Contractor — it is simplicity itself to install.

Here are the details :—

Sunvic room thermostats have an overall range of 54°F. (30°C.) and will control temperatures to a differential within 2°F. (1.5°C.) depending upon precise conditions in the room.

CONSTRUCTION

Contained in robust dust-repelling case. Large, easily connected terminals revealed by undoing a single screw.

ACCELERATION HEATING

Small carbon resistor fitted in thermostat ensures even, comfortable control when the instrument is regulating loads of 8A or less.

INSTALLATION

Only one screw needed to secure the thermostat to the wall-mounting or conduit-box plate.

TYPES AVAILABLE

Can be supplied with a switch, enabling mains circuit to be isolated without altering the thermostat setting. Also available as reverse acting type which breaks auxiliary circuit with a fall in temperature.

Visit the AEI stand at the EDA Exhibition, Harrogate, February 28th to March 3rd

AEI

Instrumentation Division
P.O. Box 1 · Harlow · Essex Tel: Harlow 25271
Associated Electrical Industries Limited

SC/1001

CLASSIFIED ADVERTISEMENTS

PUBLIC NOTICES

MIDDLESEX COUNTY COUNCIL
Education Committee

TWICKENHAM TECHNICAL COLLEGE

A ten-day Residential Course on MODERN ELECTRICAL INSTALLATION TECHNIQUES

(including Electrical Floor-Warming) will be held from Monday, 19 June, to Thursday, 29 June, 1961.

The course includes:
Installation design;
Floor-warming and heat storage;
Lighting installation design;
Installation of motors and lifts;
Protective methods.

Lecturers will be drawn from senior engineers working in the above fields.

Fees: Residential .. 30 gns
Non-residential .. 15 gns

Brochures and application forms available from:
The Principal,
Twickenham Technical College,
Egerton Rd,
Twickenham, Middx.
Tel.: POPesgrove 6656.

(T 662)

TENDERS INVITED

LLANELLY RURAL DISTRICT COUNCIL
Sodium Lighting on Trunk Road A48 (Crosshands)

TENDERS are invited by the above Local Authority for the following on a fixed-price basis on trunk road A48, within the Rural District of Llanelly:
(a) Supply and erection of 12 steel columns with 140 W Sodium Discharge Lamps.
(b) Supply and erection of 2 steel columns with 85 W Sodium Discharge Lamps.
(c) Supply and delivery only of 21 140 W Sodium Discharge Lamps complete.

Copies of Specification, Bill of Quantities and plans may be obtained by post from the Architect and Surveyor to the Council, 2 Queen Victoria Rd, Llanelly, on payment of a deposit of £2 2s, made payable to the Llanelly Rural District Council, which will be returned on receipt of a bona fide tender and return of documents loaned.

Tenders marked "Street Lighting A48" in plain sealed envelopes should be lodged with the undersigned not later than 12 o'clock noon on Tuesday, 14 March, 1961. The lowest or any tender will not necessarily be accepted.

C. B. HUGHES,
Clerk of the Council.

Castle Buildings,
Llanelly.
Carms.
14 Feb., 1961. (T 645)

METROPOLITAN BOROUGH OF WANDSWORTH
Street Lighting Equipment

TENDERS invited for the supply and delivery of:
(1) 63 35 ft steel lamp columns
and
(2) 126 Transformers, 140 watt
126 Condensers, 140 watt
63 Double Action Timeswitches
63 280 watt Enclosed Lanterns.

Tender documents, obtainable from the Borough Engineer, must reach me by 10 a.m., 8 March, 1961.

J. NOEL MARTIN,
Town Clerk.

Municipal Bldgs,
Wandsworth, S.W.18. (T 664)

NORTH OF SCOTLAND HYDRO-ELECTRIC BOARD
132kV Transmission Line between Mybster and Thurso and 33kV Lines at Thurso

TENDERS are invited for the supply, delivery and erection of the above double-circuit steel tower line and two short single-circuit wood pole lines.

Copies of the Tender Document may be obtained on application to the Board's Chief Electrical and Mechanical Engineer, 16 Rothesay Terr, Edinburgh 3, on receipt of a deposit of £2 2s (returnable). The Board do not bind themselves to accept the lowest or any tender. (T 649)

TENDERS

Tenders are invited for the supply of all or any of the following:
1. Single Phase 2-wire, 230 V Meters and Sockets.
2. Bare Copper Wire.
3. Line Hardware Equipment.
4. Fluorescent Street Lighting Equipment.
5. Aluminium Tie Wire.
6. Current Transformer Boxes.

Specifications may be obtained on writing to the Purchasing Officer, Trinidad and Tobago Electricity Commission, P.O. Box 121, Port-of-Spain, Trinidad, W.I.

Closing date for Tenders: 24 April, 1961. (T 700)

APPOINTMENTS VACANT

NOTTINGHAM AND DISTRICT TECHNICAL COLLEGE, BURTON STREET, NOTTINGHAM

Principal: D. A. R. Clark, MS.C.(TECH.), M.I.MECH.E.

APPLICATIONS are invited for the post of:
LECTURER IN ELECTRICAL MACHINES

Salary in accordance with the Burnham Technical Scale as follows: £1,370 x £35—£1,550 per annum. A salary above the minimum will be paid in approved cases.

Research encouraged. Facilities and equipment available.

Further particulars and form of application may be obtained from the Principal, to whom completed forms should be returned not later than 10 March, 1961. (T 684)

SOUTH OF SCOTLAND ELECTRICITY BOARD
Glasgow Area

APPLICATIONS are invited for the following superannuable posts:
(1) DISTRICT COMMERCIAL ENGINEER
(EASTERN DISTRICT)
(Ref. GC/2/61).

Candidates should be Corporate Members of the Institution of Electrical Engineers or possess equivalent qualifications and have experience in the various applications of electricity, a knowledge of installation work, and be conversant with tariffs, sales and all aspects of service to consumers. Successful candidate will require to reside within reasonable distance of District Headquarters.

Salary: £1,440/£1,610 per annum in accordance with Class G, Grade 3 (Scale 13) of N.J.B. Salary Scale.

(2) THIRD ASSISTANT ENGINEER
(CONSTRUCTION)
(Ref. GE/10/61)

Candidates should have a sound theoretical knowledge and practical training with experience in the erection and commissioning of E.H.V. switchgear, transformers and protective gear and general sub-station construction work. Graduateship of the Institution of Electrical Engineers or equivalent qualification is desirable. The successful candidate will require to reside within reasonable distance of Area Headquarters.

Salary: £1,190/£1,325 per annum in accordance with Class L, Grade 10 (Scale 10) of N.J.B. Salary Scale.

Applications, quoting the appropriate reference number, should be made on the standard application form which may be obtained from and should be returned to the Area Secretary, South of Scotland Electricity Board, Glasgow Area, P.O. Box 6, 75 Waterloo St, Glasgow C.2, to be received not later than Friday, 10 March, 1961. (T 692)

SOUTHERN ELECTRICITY BOARD
ASSISTANT ENGINEER
(SUBSTATION MAINTENANCE)

BOURNEMOUTH District of No. 4 (Bournemouth) Sub-Area. Salary: N.J.B. Class J, Grade 9 (£1,115/£1,245 per annum). N.J.B. Conditions of Service.

The duties of the post will be to assist with the maintenance of plant and equipment at outdoor and indoor substations on both urban and rural systems and to undertake standby duties. Candidates should have experience of the commissioning and maintenance of plant and equipment up to, and including 33 kV. The possession of suitable technical qualifications will be an advantage.

The successful candidate will be required to contribute to the Electricity Supply (Staff) Superannuation Scheme, if eligible.

Applications on forms obtainable from the Sub-Area Secretary, 1 Priory Rd, Bournemouth, Hants., and returned to him, quoting Z.1321, not later than 6 March, 1961. (T 686)

CENTRAL ELECTRICITY GENERATING BOARD
South Wales Division

APPLICATIONS are invited for the superannuable N.J.B. appointment of
ASSISTANT SHIFT CHARGE ENGINEER
TIR JOHN POWER STATION, SWANSEA
Vacancy No. 34/ET/61.

Salary: Class H, Grade 9, Scale 8 (£1,040/£1,165 per annum) plus 10% shift allowance.

Applicants should possess H.N.C. or equivalent qualifications and have had operating experience in a modern power station.

Special application forms are obtainable from Divisional Secretary, South Wales Division, Central Electricity Generating Board, Twyn-y-Fedwen Rd, Gabalfa, Cardiff, to be returned by 6 March, 1961. (T 681)

Advertisements should be sent to the Classified Advertisement Dept., Electrical Times, Sardinia House, Sardinia Street, London, W.C.2, before 10 a.m. on TUESDAY of the week of issue. Official Displayed Advertisements are charged at 46s. per inch, and all other classified advertisements at 3s. 6d. per line. Situations Wanted four insertions at twice the single insertion rate. Fee for Box Number and postage on replies 2s.

UGANDA GOVERNMENT

INSPECTOR OF WORKS (ELECTRICAL)

REQUIRED by Public Works Department. Appointment on contract for one tour of 30-36 months in first instance. Salary according to age and experience in scale (including inducement pay) rising to £1,341 a year. Gratuity 13½% of total salary drawn. Outfit allowance £30 payable. Free passages. Liberal leave on full salary.

A recent report of an East African Salaries Commission recommends a substantial increase on this salary scale, and this is at present under consideration.

Candidates, over 30 years, must possess O.N.C. (Electrical) or equivalent qualification, have served a full apprenticeship and had subsequent experience in maintenance of industrial electrical equipment and large installations. They must be fully conversant with U.K. Home Office Electricity Rules, Electricity Regulations under the Factories Act and those of the Electrical Commissioners.

Apply to CROWN AGENTS, 4 Millbank, London S.W.1, for application form and further particulars, stating age, name, brief details of qualifications and experience and quoting reference M2A/50843/EE. (T 650)

THE SOUTH WALES ELECTRICITY BOARD

DISTRICT COMMERCIAL ENGINEER/ ASSISTANT COMMERCIAL ENGINEER

APPLICATIONS are invited for the following superannuable posts in the Cardiff and East Central Area:

DISTRICT COMMERCIAL ENGINEER MERTHYR/ABERDARE DISTRICT

The District covers 120 sq miles and serves 45,000 consumers. It is varied in character and has an important industrial component, in addition to a rural and urban load.

The successful candidate will be responsible to the District Manager for the supervision and control of the District Commercial organisation. Applicants must have had experience in the development of electricity supply, control of showrooms and sales staff, administration and operation of hire purchase schemes, electrical contracting and consumers' service. Candidates should possess a minimum qualification of H.N.C. (Electrical Engineering); Corporate membership of the Institution of Electrical Engineers is desirable.

Salary: N.J.B. Class G, Grade 2, Scale 14 (£1,535/£1,720 per annum).

Please quote reference 17/61/ET, endorsing envelope "District Commercial Engineer."

ASSISTANT COMMERCIAL ENGINEER RHONDDA DISTRICT

The successful applicant will be responsible for negotiating terms with industrial and large commercial consumers and for rural development. He will be required to investigate tariff and account queries, voltage complaints and be responsible for commercial statistics in general.

Salary: N.J.B. Class F, Grade 7, Scale 8 (£1,040/£1,165 per annum).

Please quote reference 18/61/ET, endorsing envelope "Assistant Commercial Engineer."

Applications for the above posts, stating age, present position, present salary, qualifications and experience, should be addressed to C. L. Townsend, ASSOCIATE I.E.E., Manager, Cardiff and East Central Area, 445-447 Cowbridge Rd East, Cardiff, to arrive not later than 11 March, 1961.

R. G. WILLIAMS,
Secretary.
(T 668)

NORTHAMPTON COLLEGE OF ADVANCED TECHNOLOGY, LONDON, E.C.1

APPLICATIONS are invited, especially from those in industry, for the following appointments:

(a) LECTURER IN ELECTRICAL POWER AND MACHINES;
(b) LECTURER IN ELECTRONICS OR MEASUREMENTS;
(c) LECTURER IN GENERAL ELECTRICAL ENGINEERING;
(d) ASSISTANT LECTURER IN GENERAL ELECTRICAL ENGINEERING.

The work of the Department is concerned with the B.Sc.(Eng.) Internal Degree of the University of London; Industrially Based Sandwich Course leading to the Diploma in Technology (Dip. Tech. (Eng.)); Post graduate courses in Electrical Engineering and Full-time Research.

The posts also provide facilities for research, development, and experience in industrial liaison. Applicants should possess an Honours Degree, or an Honours Diploma in Technology, in Electrical Engineering, and will be encouraged to read for a Higher Degree.

Lecturers appointed direct from industry will not have a heavy teaching programme, or deliver many lectures, while gaining experience. In-service training provided.

Salary scales:
Lecturer: £1,370 x £35—£1,550 p.a.
Assistant Lecturer: £895 x £27 10s—£1,345 p.a.

Plus, in each case, a London Allowance of £38 increasing to £51 at age 37. Starting salary dependent upon industrial or teaching experience.

Particulars and form of application from the Secretary, Northampton College of Advanced Technology, St. John St, E.C.1.
(T 670)

CENTRAL ELECTRICITY GENERATING BOARD
Eastern Division

APPLICATIONS are invited for the following appointment:

GENERAL ASSISTANT ENGINEER
RYE HOUSE GENERATING STATION
(HODDESDON, HERTS)

Salary within the range of £625/£805 per annum, plus £90 Shift Allowance when required to work on shift.

The commencing salary will depend upon the duties and responsibilities.

Duties include assisting in the Electrical Control Room and experience in the technical operation of electrical, boiler house, and turbine house plant, testing etc. The post will provide a suitable basis for promotion to higher technical grades.

Manual workers in skilled grades with suitable technical training will be considered. Previous experience in a generating station and/or technical training to the standard of Ordinary National Certificate or its equivalent will be an advantage.

Applications, quoting reference S.V. No. 1406, stating age, qualifications, experience and present position, should be sent to the Controller, Central Electricity Generating Board, Eastern Division, West Farm Pl, Chalk La, Cockfosters, Barnet, Herts, to arrive not later than 4 March, 1961. (T 655)

CENTRAL ELECTRICITY GENERATING BOARD
London Division

APPLICATIONS are invited for the following superannuable post. Conditions of service in accordance with N.J.B. Agreement, Schedule A. Salary includes London Allowance.

ASSISTANT ENGINEER (SHIFT RELIEF)
STEPNEY POWER STATION
Vacancy No. 61/93.

Sound technical training and preferably some experience of power station operation. Duties will include provision of shift relief mainly in the Electrical Control Room. The qualification of H.N.C.(E) would be an advantage.

Salary: Class F, Grade 12, £755/£845 per annum, plus £90 shift per annum.

Applications, quoting vacancy no., to (or on form from), Personnel Officer, Central Electricity Generating Board, London Division, P.O. Box No. 136, London W.1, by 7 March, 1961. (T 663)

EASTERN ELECTRICITY BOARD

APPLICATIONS are invited for the following appointments:

The successful candidates will be required to contribute to a superannuation scheme and may be required to undergo a medical examination.

Chilterns Sub-Area

LUTON DISTRICT
SENIOR DEMONSTRATOR
25/61.R.

The duties are mainly concerned with the sales development of all types of domestic appliances and the promotion of demonstrations in the Board's Showrooms and in suitable halls to further this end.

Applicants should have had a sound training in domestic science and hold a recognised diploma. They should be capable of arranging and giving talks on domestic electrical subjects to womens' organisations, school authorities and groups of students.

Salary: N.J.C. Grade 2 (£700/£775.

Apply by letter to the Manager, Luton District, Eastern Electricity Board, 487 Dunstable Rd, Luton, by 10 March, 1961.

WATFORD DISTRICT

(a) TWO FOURTH ASSISTANT ENGINEERS
26/61.N.

(b) DISTRICT COMMERCIAL ASSISTANT
27/61.R.

(c) SENIOR SALES REPRESENTATIVE
29/61.R.

Candidates for (a) should have had a sound technical training and suitable experience in the construction, operation and maintenance of H.V. and L.V. underground systems including substations. Knowledge of overhead lines would be an advantage.

The successful applicants will be required, initially, to assist with the extensive change of voltage programme which is envisaged in this District.

Candidates for (b) should be fully experienced in modern installation practice and be able to supervise this type of work.

The work includes the preparation and scrutiny of inventories and the general commercial aspects of Change of Voltage work.

Candidates for (c) must have had a sound practical training with experience in electrical installation work for domestic and commercial premises. A good knowledge of electrical water heating and ability to prepare wiring specifications and estimates is required with an all round knowledge of, and an ability to sell, domestic electrical appliances.

Salary: (a) N.J.B. Class G, Grade 11 (£825/£940) plus London Allowance, and (b) and (c) N.J.C. Grade 2 (£700/£775) plus London Allowance.

Apply by letter to the Manager, Watford District, Eastern Electricity Board, The Parade, High St, Watford, by 10 March, 1961.

Northmet Sub-Area

CONSTRUCTION DEPARTMENT
SUB-AREA HEADQUARTERS
FOURTH ASSISTANT ENGINEER
(Ref. 1037) 24/61.R.

Candidates should have had a sound technical training, should be suitably experienced in the supervision of underground cable laying, both by direct and contract labour, and should be capable of testing, commissioning and fault location on cable systems up to and including 33 kV.

Salary: N.J.B. Class N, Grade 12 (£1,190/£1,325) plus London Allowance.

Apply by letter to the Manager, Eastern Electricity Board, Northmet Sub-Area, Northmet Hse, Southgate, London N.14, by 6 March, 1961.

HORNSEY DISTRICT
THIRD ASSISTANT ENGINEER
(Ref. 1026) 23/61.R.

Candidates should have had a sound technical training and suitable experience in the construction, operation and maintenance of H.V. and L.V. distribution systems, including substations.

Salary: N.J.B. Class G, Grade 9 (£965/£1,090) plus London Allowance.

Apply by letter to C. Bradley, M.I.E.E., Manager, Eastern Electricity Board, The Broadway, Crouch End, London N.8, by 6 March, 1961. (T 685)

SOUTH WESTERN ELECTRICITY BOARD

SECOND ASSISTANT ENGINEER (PLANNING)
DEVON GROUP (EXETER)

SALARY within Class K, Grade 7, Salary Scale 12, £1,350/£1,500 per annum of the N.J.B. Agreement.

The person appointed will be required to undertake planning, the preparation of schemes and estimates for the extension and reinforcement of the distribution system up to 33 kV, both overhead and underground.

Candidates should have a wide experience of planning, construction and operation of distribution systems and a knowledge of budget preparation and long-term forecasting.

Qualifications equivalent to Corporate Membership of the Institution of Electrical Engineers are most desirable.

THIRD ASSISTANT ENGINEER
(PROTECTION AND TESTING)
DEVON GROUP (EXETER)

Salary within Class K, Grade 11, Salary Scale 8, £1,040/£1,165 per annum, of the N.J.B. Agreement.

The duties of the successful candidate will include the testing and commissioning of all types of plant and protective gear, fault location, plant specification and design of protective and control systems.

Applicants should have had sound experience of the construction, operation and maintenance of distribution systems up to and including 33 kV, both overhead and underground.

Qualifications equivalent to Corporate Membership of the Institution of Electrical Engineers are most desirable.

Applications for the Devon Group posts to be made on standard form AE6/ACT, OBTAINABLE BY POSTCARD ONLY, from the Group Administrative Officer, South Western Electricity Board, 57 Paul St, Exeter. Closing date for receipt of completed applications is 11 March, 1961.

THIRD ASSISTANT DISTRICT ENGINEER
(PLANNING)
EXETER

Salary within Class G, Grade 9, Salary Scale 7, £965/£1,090 per annum, of the N.J.B. Agreement.

The duties of the successful candidate will include the planning of 11 kV/LV development for rural areas and system reinforcement schemes associated with a large urban and rural distribution network. He will be required to liaise with the Post Office and other authorities. Candidates should be thoroughly familiar with overhead line design, survey work, the preparation of profiles and materials schedules, statutory consent procedures and wayleaves. The person appointed may be required to undertake standby duties.

Possession of the Higher National Certificate in Electrical Engineering will be an advantage and the ability to drive a car is desirable.

THIRD ASSISTANT DISTRICT ENGINEER
EXETER

Salary within Class G, Grade 9, Salary Scale 7, £965/£1,090 per annum, of the N.J.B. Agreement.

The successful candidate will be responsible to a Second Assistant District Engineer for duties in connection with operation, maintenance and construction work on the distribution system up to and including 33 kV.

The person appointed will be required to take part in a rota of standby duty for the whole District to deal with faults and interruptions to supply.

Previous all-round experience on E.H.V., H.V. and L.V. overhead and underground networks and substations, particularly in urban areas, is necessary. Appropriate technical qualifications at least equivalent to Higher National Certificate in Electrical Engineering and the possession of a current driving licence is desirable.

Applicatons for the Exeter District posts to be made on standard form AE6/ACT, OBTAINABLE BY POSTCARD ONLY, from the District Manager, South Western Electricity Board, 3 Bedford St, Exeter. Closing date for receipt of completed applications is 11 March, 1961. (T 691)

CENTRAL ELECTRICITY GENERATING BOARD

East Midlands Division

STATION SHIFT CONTROL ENGINEER
DRAKELOW "A" POWER STATION
Vacancy No. 27/61.

APPLICATIONS are invited for the position of Station Shift Control Engineer at Drakelow "A" Power Station, near Burton-on-Trent, Staffs.

Applicants should have had a good general education and technical training with practical experience in the control and operation of large modern switchgear. Preference will be given to candidates who possess technical qualifications to Higher National Standard.

Salary will be in accordance with Class J, Grade 10 (£1,040/£1,165 per annum) of the National Joint Board Agreement, plus 10% allowance for shift duties.

Closing date for receipt of applications: 10 March, 1961.

ASSISTANT ENGINEERS (OPERATION)
HIGH MARNHAM POWER STATION
Vacancy No. 28/61.

Applications are invited for the positions of Assistant Engineers (Operation) at High Marnham Power Station, near Newark, Notts.

Applicants should have experience of the operation and control of modern High Pressure Boiler and Turbine Plant, and should possess a H.N.C. in Mechanical or Electrical Engineering, but consideration will be given to those holders of a lower technical qualification who have sound operating experience.

Salary will be in accordance with Class N, Grade 10 (£1,350/£1,500 per annum) of the National Joint Board Agreement, plus 10% allowance for shift duties.

Closing date for receipt of applications: 10 March, 1961.

ASSISTANT COAL AND ASH HANDLING ENGINEER
DRAKELOW "A" AND "B" POWER STATIONS
Vacancy No. 29/61.

Applications are invited for the position of Assistant Coal and Ash Handling Engineer at Drakelow "A" and "B" Power Stations, near Burton-on-Trent, Staffs.

Candidates should have knowledge of the operation of coal, ash and dust handling plant at a large modern power station, and of the organisation and planning of coal supplies by road and rail.

The duties of the successful applicant will include the organisation of ash disposal by lorry transport.

Salary will be in accordance with Class M, Grade 10 (£1,275/£1,410 per annum) of the National Joint Board Agreement.

Closing date for receipt of applications: 10 March, 1961.

ASSISTANT MAINTENANCE ENGINEER
(ELECTRICAL)
HIGH MARNHAM POWER STATION
Vacancy No. 6/61.

Applications are invited for the position of Assistant Maintenance Engineer (Electrical) at High Marnham Power Station, near Newark, Notts.

Applicants should have received a sound training in electrical engineering.

Previous experience in electrical maintenance and a knowledge of planning procedure is desirable.

Salary will be in accordance with Class N, Grade 8 (£1,535/£1,720 per annum) of the National Joint Board Agreement.

Closing date for receipt of applications: 3 March, 1961.

Previous applicants for this post need not re-apply.

COAL AND ASH HANDLING ENGINEER
NOTTINGHAM POWER STATION
Vacancy No. 30/61.

Applications are invited for the position of Coal and Ash Handling Engineer at Nottingham Power Station, Queen's Dr, Nottingham.

Applicants must have a wide experience of operation and maintenance at a large power station employing P.F. Boiler Plant.

continued in next column

continued from previous column

Candidates should have suitable technical qualifications admitting to Corporate Membership of the Institution of Mechanical Engineers and/or the Institution of Electrical Engineers.

The successful applicant will be responsible to the Station Superintendent for the programming of coal traffic and for the operation of the coal and ash plants.

Salary will be in accordance with Class K, Grade 8 (£1,275/£1,410 per annum) of the National Joint Board Agreement.

Closing date for receipt of applications: 10 March, 1961.

These appointments will be pensionable within the terms and conditions of the Electricity Supply (Staff) Superannuation Scheme.

Applications should be submitted on the official form, AE6/ACT, which may be obtained from the Station Superintendent concerned, and should be returned to him by the date stated.

O. S. WOODS,
Divisional Controller.
(T 687)

TRINIDAD AND TOBAGO ELECTRICITY COMMISSION

VACANCY FOR SHIFT CHARGE ENGINEER

THE Trinidad and Tobago Electricity Commission has a vacancy for a Shift Charge Engineer.

Applicants should have experience in the operation of modern steam turbines, water tube boilers and diesel generators, and must have Graduate Membership of the I.E.E., or I.Mech.E., or Associate Membership of the I. Mar.E., or the Higher National Certificate in Electrical or Mechanical Engineering or Second Engineer's M.O.T. Diesel and Steam Certificate or Charge Certificate, Royal Navy.

The annual salary is £1,408 rising by three annual increments to £1,537. This salary includes a payment for Shift Work.

A partly furnished house will be provided at a rent of £10 8s 4d per month, plus a small extra charge for heavy furniture.

An outfit allowance of £60 is paid on arrival in Trinidad.

First-class passage to Trinidad will be provided for the successful applicant, his wife and children up to a maximum cost of four adult passages. First-class leave passages to the United Kingdom will be provided every three years.

There is a Superannuation Scheme similar to the C.E.G.B. and Area Boards' Scheme.

Information on Trinidad can be obtained from the West India Committee, 40 Norfolk St, London W.C.2.

Applications giving full details of qualifications, age, experience, etc., together with copies of two recent testimonials should be sent by Air Mail to reach the General Manager, Trinidad and Tobago Electricity Commission, P.O. Box 121, Port of Spain, Trinidad W.I., by 31 March, 1961. (T 672)

CENTRAL ELECTRICITY GENERATING BOARD

Midlands Project Group

SECOND ASSISTANT ENGINEER
(MECHANICAL)

APPLICATIONS are invited for the appointment of a Second Assistant Engineer (Mechanical) in the Midlands Project Group at Aberthaw Power Station Site, South Wales.

Applicants should have experience in the manufacture and erection of boilers, turbo-alternators and other mechanical equipment associated with a modern power station.

Applicants should preferably be Associate Members of the Institution of Mechanical Engineers.

The salary will be within Grade 5, Scale 15 (£1,400/£1,830 per annum), Schedule C of the National Joint Board Agreement.

Applications should be made on standard form AE6, available from the Administrative Officer, Midlands Project Group, P.O. Box No. 314, Bournville, Birmingham 30, and should be returned to him not later than 13 March, 1961.

Envelopes should be marked "Confidential, Staff Vacancy Number MPG.8/61."

(T 688)

YORKSHIRE ELECTRICITY BOARD
No. 4 (Leeds) Sub-Area
SUB-AREA ENGINEER

APPLICATIONS are invited from professionally qualified Electrical Engineers for the appointment of Sub-Area Engineer in No. 4 (Leeds) Sub-Area.

Salary: N.J.M. Class C, Grade 6 £2,380/£2,595 per annum.

Applications, together with the names of two referees, should be sent to the Manager, No. 4 (Leeds) Sub-Area, Yorkshire Electricity Board, Bramhope, nr. Leeds, not later than 10 March, 1961.

Head Office
ASSISTANT CONTROL ENGINEERS

Applications are invited from persons who have had operational experience and who should hold the Higher National Certificate or its equivalent, to undergo a course of training in one of the Board's six Regional Control Centres. Expenses will be paid during the training period. Subject to satisfactory service, assistant control engineers will be promoted to Shift Control Engineers as and when vacancies arise.

Salary: (during training) N.J.B. Class BX, Grade 8 (Transitional to Scale 11), within the range £1,105/£1,410 per annum, plus 10% shift allowance, and on taking over responsibilities for a shift, N.J.B. BX.6, within the range £1,285/£1,610 per annum, plus 10% shift allowance.

Applications, together with the names of two referees, should be sent to the Secretary, Yorkshire Electricity Board, Wetherby Rd, Scarcroft, nr. Leeds, not later than 10 March, 1961. (T 689)

Leading Domestic Appliance Company in the London area requires the following additional staff to meet an expanding development programme on electric cookers, refrigerators and other appliances.

DESIGN ENGINEER

Capable of initiating and evaluating designs is required to work as Assistant to Chief Engineer. A good knowledge of mechanical design, preferably to include some experience of rotating machinery. Previous experience in this field desirable.

SENIOR DEVELOPMENT ENGINEER

To take responsible position in a laboratory. Work to include testing of designs through all stages of development. Some technical qualifications are desirable, but more important is previous experience in the domestic appliance field.

Both the above positions offer a first-class opportunity for a progressive career working with a successful design team.

Reply to Box No. 8211, Electrical Times.

(T 667)

CHARTERED ELECTRICAL ENGINEER
required for
NORTHERN NIGERIA

A vacancy exists for a Chartered Electrical Engineer with a hydro-electric power undertaking in Northern Nigeria. Pleasant climate 4,000 ft above sea level. Age 30 to 35. Salary grade: £1,440/£1,690 according to age, qualification and experience. Pension and Life Assurance Scheme. Eighteen months' tours with three months' leave on full salary. Free furnished quarters. Free passages self, wife and two children, or equivalent benefits if children remain at home.

Write Box F385, c/o Streets, 110 Old Broad St, E.C.2.

(T 695)

SOUTH EASTERN ELECTRICITY BOARD
SENIOR ENGINEERING DRAUGHTSMAN
CROYDON AND PURLEY DISTRICT

SALARY £1,165/£1,295 per annum including London Allowance under N.J.B. Class J, Grade 9. Superannuable. Applicants should be suitably qualified and capable of supervising a large District drawing office under the District Engineer. Experience in basic design, layout of substations up to 11 kV, presentation of data and mains and system records is essential. Applications quoting ET and naming two referees, on forms from District Manager, Seeboard, Electric Hse, Wellesley Rd, Croydon, by 8 March, 1961.

FITTER (ELECTRICAL)
CRAWLEY AND HORSHAM DISTRICT

Wages 5s 6½d per hour for 42-hour, 5-day week under N.J.I.C. Agreement. Applicants should be experienced in the erection and maintenance of H.V. and L.V. switchgear and transformers. Applications quoting ET and naming two referees to District Manager, Seeboard, 50-52 The Broadway, Crawley, Sussex, by 6 March, 1961.

GEORGE WRAY,
Secretary.
(T 693)

DORSET COUNTY EDUCATION COMMITTEE
South Dorset Technical College

APPLICATIONS are invited from suitably qualified persons for the following full-time teaching posts:

GRADE A to teach ELECTRICAL INSTALLATION work up to the standard of the C.G.L.I. "C" certificate. Applicants should have had some industrial experience in this field. The teacher will be required to take up duties on 1 May, 1961, or as soon as possible.

GRADE B to teach ELECTRICAL ENGINEERING and some mechanical subjects to O.N.C. level. This post is vacant on 1 Sept., 1961.

Basic salary scale: Grade A, £520/£1,000; Grade B, £700/£1,150, plus additions for graduate qualifications and time spent in full-time training.

Further particulars and forms of application may be obtained from the Principal, South Dorset Technical College, Newstead Rd, Weymouth. (T 659)

J. & P.

SENIOR SALES ENGINEER

A Senior Sales Engineer is required by Johnson & Phillips Limited to promote the sale of the company's products to major industrial concerns, and also through Consulting Engineers. He will probably be between 30 and 35 years of age and preferably a Corporate Member of the Institution of Electrical Engineers. In addition he should have some sales experience and a technical knowledge of electrical distribution equipment. The post will be based upon the London branch of the company and applications giving preliminary details should be sent to the Employment Manager, Johnson & Phillips Limited, Charlton, S.E.7. (T 675)

LIGHTING PLANNER

Lighting Installation Planner required (min. age 23/24) as an assistant in the Illuminating Engineering Service Department. Applicants should have electrical background or experience. Residence within easy reach of Tottenham is desirable. Apply stating age, experience and salary required to the Chief Lighting Engineer, The Benjamin Electric Limited, Brantwood Rd, Tottenham, London N.17. (T 674)

MIDLANDS ELECTRICITY BOARD

APPLICATIONS are invited for the following superannuable posts:

South Staffs. and North Worcs. Sub-Area
GENERAL ASSISTANT DISTRICT COMMERCIAL ENGINEER
(SMETHWICK/WEST BROMWICH)

Applicants should have had practical experience in the sale and installation of domestic and commercial electrical equipment and the work associated therewith. The successful applicant will be required to assist in all branches of commercial work, including advising consumers on domestic, commercial and industrial equipment, estimating and contracting work. Technical qualifications desirable. Salary: £965/£1,090 per annum (N.J.B. Grade K.12). Apply, by letter, within ten days, quoting ref. SS/T/510, stating age, experience, present position and salary to Mr H. A. P. Caddell, Sub-Area Manager, Midlands Electricity Board, P.O. Box No. 9, Toll End Rd, Tipton, Staffs.

THIRD ASSISTANT DISTRICT COMMERCIAL ENGINEER (BRIERLEY HILL)

The duties will include estimating for and supervising electrical installation work on consumers' premises. Applicants should have had a sound technical training and experience of estimating and installation practice. Technical qualifications desirable. Salary: £890/£1,015 per annum (N.J.B. Grade G.10). Apply, by letter, within 14 days, quoting ref. SS/T/511, stating age, qualifications, experience, present position and salary to Mr H. A. P. Caddell, Sub-Area Manager, Midlands Electricity Board, P.O. Box No. 9, Toll End Rd, Tipton, Staffs.

GENERAL ASSISTANT DISTRICT ENGINEER (STOURBRIDGE)

Applicants should have suitable technical qualifications and training in engineering duties associated with electricity distribution systems. Salary: £715/£805 per annum (N.J.B. Grade F.12). Apply, by letter, within ten days, quoting ref. SS/T/509, stating age, experience, present position and salary to Mr H. A. P. Caddell, Sub-Area Manager, Midlands Electricity Board, P.O. Box No. 9, Toll End Rd, Tipton, Staffs.

Worcester and District Sub-Area
THIRD ASSISTANT ENGINEER
(MAINS CONSTRUCTION SECTION)
(HEADQUARTERS)

Duties will include the construction and maintenance of 66 and 33 kV overhead lines and underground cables, together with fault location on 11 kV underground cables. Salary: £1,115/£1,245 per annum (N.J.B. Grade K.10). Apply, by letter, within 14 days, stating age, experience, present position and salary to Mr R. Mallet, Sub-Area Manager, Midlands Electricity Board, P.O. Box 52, Blackpole Rd, Worcester.

F. W. CATER,
Secretary.
(T 666)

UNITED KINGDOM ATOMIC ENERGY AUTHORITY
(PRODUCTION GROUP)
CAPENHURST WORKS, CAPENHURST, NR. CHESTER

A DRAUGHTSMAN

is required in the Electrical Section of the Design Office at the above factory. He will be required to prepare drawings and specifications of equipment for the distribution and application of electric power at voltages up to 11 kV.

Applicants must have served a recognised engineering apprenticeship and possess an O.N.C. in Electrical Engineering. Good drawing office experience is essential.

The salary scale is £650 at age 21, rising to a maximum of £1,065 a year.

Generous leave allowance, 5-day week, contributory superannuation.

Send postcard for application form, quoting Ref. CAP.269/J8, to the Personnel Manager at the above address.

Closing date: 13 March, 1961. (T 673)

SENIOR CONTRACTS ENGINEERS

required by National Contractors. Wide experience of all types of Electrical Installations essential. Bonus Scheme. Contributory Pension Scheme with Life Assurance. Write under private cover stating age, experience and salary required to Duncan Watson (Electrical Engineers) Ltd., Andrew Hse, 60 Worship St, London E.C.2.

(T 576)

CUMBERNAULD DEVELOPMENT CORPORATION

ASSISTANT ELECTRICAL ENGINEERS (TWO) required. H.N.C. or Graduate I.E.E. essential. Candidates must have served an apprenticeship in electrical installation work and have had experience in the design and supervision of lighting, power and heating installation in buildings including factories and houses.

Salary scale £960/£1,140 per annum. Commencing salary according to qualifications and experience. Five-day week. Assistance with housing where appropriate. Application forms can be obtained from and should be returned to the General Manager, Cumbernauld Development Corporation, Cumbernauld Hse, Cumbernauld, Glasgow, NOT LATER THAN Monday, 13 March, 1961.

(T 661)

ELECTRICAL ENGINEERS

With degree or equivalent qualifications and experience of either machines or switchgear and protection design and application required for work in connection with nuclear and conventional generating stations. Please apply stating full details of experience and salary required to Kennedy & Donkin, Consulting Engineers, 64 Royal Exchange, Manchester 2.

(T 654)

TAYLOR WOODROW CONSTRUCTION LIMITED

require

ELECTRICAL ENGINEERS

for installation and maintenance work on Civil Engineering and Building contracts.

Experience of tariff and service negotiations with Area Electrical Boards and knowledge of contractor's equipment is desirable.

These posts involve extensive travel and candidates must hold a current driving licence.

Interviews can be arranged at any time, including Saturday mornings, with expenses paid.

Write to the Personnel Manager,
345 Ruislip Rd, Southall, Middlesex.

(T 653)

TAYLOR WOODROW CONSTRUCTION LIMITED

require

ASSISTANT ELECTRICAL ENGINEERS

to work in the Electrical Department at Southall.

Candidates must have experience in the design of electrical installations for industrial and general building works and the ability to prepare specifications and estimates.

DESIGN DRAUGHTSMEN

with similar experience to assist in the preparation of contract and working drawings.

Interviews can be arranged at any time, including Saturday mornings, with expenses paid.

Write to the Personnel Manager,
345 Ruislip Rd, Southall, Middlesex.

(T 652)

Unilever

ENGINEER

ASSISTANT ENGINEER

PRODUCTION MANAGER

CEYLONESE NATIONALS ARE REQUIRED TO FILL THESE VACANCIES IN LEVER BROTHERS FACTORY IN COLOMBO

Engineering candidates should have a recognised qualification and a knowledge of Mechanical and Electrical Engineering would be of advantage. Production candidates should possess qualifications in Chemistry or Chemical Engineering. All should be men of about 30 or below who are looking for a progressive management career in their own country.

The seniority in management of the appointments will depend on experience and qualifications; for those with good experience starting salaries are attractive with the addition of a rent assistance scheme, car allowance and four weeks' annual leave.

Successful candidates will receive a few months' experience of Unilever industries in the United Kingdom before proceeding to Ceylon.

Applications, giving full particulars of training and experience should be addressed to: Personnel Division (T/322), Unilever Hse, Blackfriars, London E.C.4.

(T 641)

SOUTH OF SCOTLAND ELECTRICITY BOARD
Stirling Area

APPLICATIONS are invited for appointment as:

DISTRICT ENGINEER (BATHGATE)
(Vacancy Ref. No. 10/61).

Salary: N.J.B. Class G, Grade 2 (£1,535/£1,720 per annum).

Applicants should preferably be corporate Members of the Institution of Electrical Engineers and have had considerable experience in an engineering district of an electricity supply area including the planning, construction, commissioning, operation and maintenance of networks and substations up to and including 33 kV.

The successful candidate will be required to reside in Bathgate, West Lothian, and housing accommodation may be made available there if required.

Applications on forms to be obtained from the Area Manager, "Woodlands," St. Ninians Rd, Stirling, are to be returned to him not later than Monday, 13 March, 1961.
(T 676)

CORPORATION OF GLASGOW
ARCHITECTURAL AND PLANNING DEPARTMENT
ASSISTANT ELECTRICAL ENGINEERS

APPLICATIONS for the above superannuable appointment are invited from graduates and associate members of the Institution of Electrical Engineers.

Salary scale: £850/£1,385, with placing according to qualifications and experience. There is a point within the scale at which increments may be accelerated.

Form of application may be obtained from the Principal Administrative Officer, 20 Trongate, Glasgow C.1.

A. G. JURY,
City Architect and Director of Planning.
(T 601)

ELECTRICAL INSTALLATION DESIGN ENGINEER required by Consulting Engineers. Pension and Life Assurance Scheme in operation. Apply in writing, stating age and experience, to Messrs Pashler and Partners, City Chambers, Infirmary St, Leeds 1. (T 696)

CENTRAL ELECTRICITY GENERATING BOARD
South Eastern Division
LITTLEBROOK POWER STATION
Vacancy No. 59/61.
ASSISTANT ENGINEER (EFFICIENCY)

CANDIDATES should possess technical qualifications to at least H.N.C. standard and practical experience in generating station work would be an advantage. The successful applicant will be required to assist the Station Efficiency Engineer in investigations into the thermal performance of the plant, and will be required to work independently and to take the initiative in solving problems which arise.

Salary: N.J.B. Class L, Grade 11, £1,165/£1,295 per annum including London Allowance.

Applications giving age, details of experience, qualifications, etc., should be sent to the Station Superintendent, Littlebrook Power Station, nr. Dartford, Kent, to arrive by 9 March, 1961.

W. H. DUNKLEY,
Divisional Controller.
(T 683)

WIMPEY

QUALIFIED ELECTRICAL ENGINEERS

Applications are invited from Electrical Engineers who are seeking permanent, progressive and interesting appointments on Construction Sites at home or overseas, in the following fields of construction: Oil Refineries and Petrochemical Installations, Thermal and Hydro-electric Power Stations, Pulp and Paper Mills, Steel Works.

Pension Fund and three weeks' holiday.

Initial application in writing stating age, qualifications and experience to:

The Manager, M. & E. Department 1,
GEORGE WIMPEY AND CO. LTD.,
Flyover House, Great West Road, Brentford, Middlesex.

(T 651)

CENTRAL ELECTRICITY GENERATING BOARD

Applications are invited for the post of
SENIOR ASSISTANT ENGINEER (TECHNICAL)

in the Operational Efficiency Branch of the Operations Department at Buchanan House, London E.C.1. The duties will require the application of engineering knowledge and experience to the development and improvement of methods available for monitoring the economic operation of the Board's system and other aspects of performance which contribute to it. This will involve the determination of suitable standards and targets and the periodical review of established methods of assessing performance.

The duties will also include the co-ordination of Test results and special *ad hoc* investigation and will entail collaboration with other sections of the Branch and liaison with other Branches and Departments. Candidates should hold a degree in Engineering, or an equivalent qualification, and recent experience of Power Station Operation or System Operation is desirable.

Salary within scale £1,805/£2,295 p.a.

Applications stating age, qualifications, experience, present position and salary, to the Appointments Officer, 24-30 Holborn, London E.C.1, by 10 March. Envelopes should be marked "Confidential. Ref. ET/84." (T 701)

MEM

Applications are invited for appointment to our sales staff as representative operating within the South Eastern Electricity Board area. The position offers excellent opportunities for the right man—it is pensionable and a motor car is provided. Please apply in writing to General Sales Manager, Midland Electric Manufacturing Co. Ltd., Reddings La, Tyseley, Birmingham 11.

(T 699)

J. & P. **TRANSFORMER DEVELOPMENT**

A development unit and pilot plant is to be created in a locality to be selected.

An experienced transformer design engineer will be required to build up the unit and control the operation of the plant. This is an appointment of senior responsibility and applications are invited from men with the requisite qualifications.

Applications, which will be treated in strict confidence, should, in the first instance, be addressed to the General Manager, Johnson & Phillips Limited, Charlton, S.E.7.

(T 678)

THE NORTH EASTERN ELECTRICITY BOARD
Tyne Sub-Area

APPLICATIONS are invited from suitably qualified engineers for the appointment of

THIRD ASSISTANT ENGINEER
SUB-AREA COMMERCIAL OFFICER'S STAFF
WITH LOCATION AT SUB-AREA
HEADQUARTERS, NEWCASTLE UPON TYNE

Duties are connected with negotiations of supplies to smaller industrial consumers including the preparation of capital estimates and tariff agreements.

Salary: Schedule A, Class L, Grade 10, £1,190/£1,325 per annum. N.J.B. conditions of service.

Applicatons stating age, qualifications and experience to be received by Assistant Secretary (Establishments), The North Eastern Electricity Board, G.P.O. Box No. 117, Carliol Hse, Newcastle upon Tyne 1, within ten days of the appearance of this advertisement. (T 690)

COVENTRY CORPORATION

require

SENIOR CLERK OF WORKS (ELECTRICAL)

SALARY: APT. IV (£1,140/£1,310 per annum). Preference will be given to candidates who possess the H.N.C. (Electrical) and have served an apprenticeship in electrical engineering, to supervise contracts and all types of installations in public buildings including colleges, schools, also sewage works, multi-storey and other dwellings, with a sound knowledge of contract procedure including bills of quantities, interim payments and final accounts. Some knowledge of heating installations would be an advantage.

Salary according to qualifications and experience.

Car allowance. Housing accommodation may be available.

Applications forms from the CITY ENGINEER, Council Hse, Coventry, to be returned by 6 March, 1961. (T 679)

CENTRAL ELECTRICITY GENERATING BOARD
South Eastern Division
CROYDON "B" POWER STATION
Vacancy No. 60/61.
OPERATION SUPERINTENDENT

APPLICANTS should have sound operating experience in a Generating Station, preferably with P.F. boilers, and should hold H.N.C. Electrical or Mechanical. Considerable experience of labour control is essential.

Salary: N.J.B. Class J, Grade 4, £1,595/£1,780 per annum including London Allowance.

Applications giving age, details of experience, qualifications, etc., should be sent to the Station Superintendent, Croydon "B" Power Station, Beddington Farm Rd, Croydon, Surrey, to arrive by 9 March, 1961.

W. H. DUNKLEY,
Divisional Controller.
(T 682)

THE NORTH WESTERN ELECTRICITY BOARD
THIRD ASSISTANT DISTRICT ENGINEER
STALYBRIDGE DISTRICT

THE duties will include assisting in the operation, construction and maintenance of the overhead and underground distribution system, including substations, up to 33 kV. The successful applicant will be required to undertake standby duty.

Preference will be given to applicants who hold the H.N.C. in Electrical Engineering.

Salary Scale: £1,040/£1,165 p.a. Grade H.9. N.J.B. Conditions.

Applications on forms to be obtained from the Manager, No. 3 Sub-Area, The North Western Electricity Board, Union St, Oldham, and returned to him by 8 March, 1961. (T 671)

CABLE CONTRACTS ENGINEERS required with experience installations to at least 33 kV. Must be prepared travel anywhere in U.K. Apply giving details of work carried out to Contracts Manager, Enfield-Standard Power Cables Ltd., Stockingswater La, Brimsdown, Middlesex. Tel. No. Howard 2711. (T 694)

DESIGN ENGINEER required for Consulting Engineer's Office to undertake the design of electrical services for all classes of buildings, including hospitals, industrial and commercial buildings at home and abroad. Spring and Summer holidays. Pension Scheme and luncheon vouchers. Apply in writing stating age, experience, present salary and salary required to J. Roger Preston and Partners, 15 North Audley St, London W.1. (T 640)

DISPATCH SUPERVISOR / STOREKEEPER required for cable works, N.W. London. Permanent staff appointment, pension scheme. Apply stating age, experience and salary required.—Box 8197, Electrical Times. (T 647)

ENGINEER required with practical and theoretical experience in design and production of solenoid operated mechanisms, especially relays. Minimum qualifications: H.N.C. or equivalent. Salary according to age and qualifications. Apply Box No. 8205, Electrical Times, giving details of experience, qualifications, etc. (T 658)

ELECTRICAL FOREMAN SUPERVISOR experienced in H.T. and L.T. cable work and associated switchgear, transformers, etc., and fully conversant with airfield lighting schemes, to take charge of contract in Scotland.—Box No. 8201, Electrical Times. (T 656)

ENGINEERING Consultants have vacancies for STUDENT APPRENTICES also JUNIOR ENGINEERS with experience in preparation of drawings and designs for electrical installations in all types of buildings. Apply in writing to Donald Smith, Seymour and Rooley, 113 Park St, London W.1. (T 582)

LANCASTER/MORECAMBE — an old-established industrial concern in this area offers pensionable position to ELECTRICAL ENGINEERING ASSISTANT; good opportunities for gaining additional experience in the design, planning, installation and maintenance of light and heavy current electrical equipment. Age preferably not above 30 with a minimum qualification of Higher National Certificate in Electrical Engineering. Full details to Box No. 8203, Electrical Times. (T 657)

MANAGER required by Electrical Contractors experienced in comparable post handling diverse installation contracts on National scale for large Building projects. Thorough knowledge estimating, negotiations with architects and clients, able assume full responsibility for all technical and commercial aspects.

Good salary, Pension, Scheme, Company car and other attractive conditions to applicant of preferred age 42-50. Box No. 8193, Electrical Times. (T 619)

POLYPHASE TEST. Experienced TESTERS or IMPROVERS. These vacancies afford unique opportunity for experience on calibration of a wide range of integrating electricity meters and ancillary equipment. Staff status after qualifying period. Please inquire: Personnel Manager, Landis and Gyr Ltd., Victoria Rd, North Acton, W.3. ACOrn 2282. (T 680)

RELAY DESIGNER required by established electrical company, to design complete range of protective and auxiliary relays. Applicants must be fully experienced in modern techniques of relay design and manufacture. Salary will be commensurate with experience and qualifications. Applications, giving full personal and professional details, to Box No. 8209, Electrical Times. (T 665)

SALES ORDER CLERK required by Enfield-Standard Power Cables preferably with knowledge of Electric Cable Industry. Good salary and working conditions.—Apply Manager, 19/21 Store St, W.C.1. (T 669)

Box No. replies to be addressed to the ELECTRICAL TIMES, Sardinia House, Sardinia Street, London, W.C.2

SENIOR and JUNIOR ELECTRICAL ENGINEERS required for London Consulting Engineer's office for installation design of industrial, commercial and educational buildings. Apply stating age, experience, training and salary required to Box No. 8183, Electrical Times. (T 588)

SENIOR CLERK required for invoicing department of group of wholesaling companies in electrical industry. Knowledge of electrical trade essential. Excellent salary and prospects, superannuation and bonus schemes. Write Box No. 8207, Electrical Times. (T 660)

TECHNICAL ASSISTANT required for factory near London producing all types of Paper, Rubber and Plastic insulated mains and telephone cables. Duties will include quality control, routine testing and development work. O.N.C. in Electrical Engineering standard. Good prospects, canteen facilities and pension fund. Reply, stating age, experience and salary required to Box 8213, Electrical Times. (T 677)

PATENTS

THE Proprietor of Patent No. 661972 for "Finger type Circuit Regulator and Contact Assembly therefor" desires to secure commercial exploitation by Licence or otherwise in the United Kingdom. Replies to Haseltine Lake and Co., 28 Southampton Bldgs, Chancery La, London W.C.2. (T 611)

AGENCIES

BRITISH Associates of Scandinavian manufacturers of decorative lighting fittings and shades, etc., are now open to receive applications from first-class agents in all areas, including London and the Home Counties.—Box No. 8177, Electrical Times. (T 554)

BUSINESS OPPORTUNITIES

ELECTRICAL WHOLESALERS small/medium sized. Some radio. Excellent leased premises, North London. Box No. 8191, Electrical Times. (T 616)

WANTED

WANTED for prompt cash, ferrous and non-ferrous SCRAP; also plant for dismantling. Buyers of second-hand machinery and plant for re-use.—W. and H. Cooper Ltd., 17 Brady St, Bethnal Green, E.1. (T 1)

WANTED: 75 kW alternator 400/440/220 a.c. 3 pl. direct coupled to Diesel Engine. Price must be very reasonable.—Box 8199, Electrical Times. (T 648)

WANTED, Hoovers in quantity. Models 1224, 119, 612, 638, also Hoover washers 0307 and 0319. Write or 'phone. AMCLJ, 87 Whitley Wood La, Reading. Phone 82196. (T 698)

WORK WANTED

DRAWING Office facilities, Electronic, Electro-Mechanical, Test Gear Designs, etc. For personal attention Ring Acorn 6044, F. Smalley, 60a High St, Acton, London W.3. (T 643)

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A.C. and D.C. SLOTMETERS: Time Switches and Quarterly Meters. Single and polyphase, 2½-100 amps. Tested and guaranteed 2 years. Television and Billiards Meters. — Tradex Meter Co., Surbiton. Elmbridge 2234/5/6. (T 9)

ELECTRIC MOTORS, D.C. and A.C. Motor Generator Sets, Alternators and Dynamos, Diesel Sets, Circuit-breakers, Switchboards, reconditioned and guaranteed. Very large stocks held.—Britannia Manufacturing Co. Ltd., Britannia Walk, N.1. CLErkenwell 5512/3/4. Stores at Chobham, Surrey. (T 7)

A.C. AND D.C. MOTORS, Generators, new and reconditioned. REWINDS and repairs promptly executed.—Service Electric Co. Ltd., Honeypot La, Stanmore, Middx. Edgware 5566. (T 224)

FLUORESCENT FITTINGS, Shells and Chokes to BS 2818 (Licence No. 3237) Coil Winding, all sheet metal work.—D. E. Cowling & Sons Ltd., Romside Trading Estate, North St, Romford 47282. (T 310)

HOUSE-SERVICE METERS, A.C. or D.C., quarterly or prepayment. — Universal Electrical, 221 City Rd, London E.C.1. (T 5)

HOUSE-SERVICE METERS, all types can be obtained by return from Selectrics, Dept. E.T., Meter Hse, Factory Row, Castle Circus, Torquay. Phone 7218. (T 8)

PURLEY CHOKES AND BALLASTS. Our 80 W tapped h.p.f. ballast with starter switchgear-holder incorporated is proving itself the most popular unit. Suitable for most fittings, 57s 6d each subject. —F. W. Blanshard Ltd. (Dept. E.T.), Purley, Surrey. Uplands 4818/9. (T 6)

PETTER DIESEL GENERATING PLANT. 125 kVA, 400/3/50. Slow speed. Used only for standby purposes. Magnificent condition. Manufacture maintained. Blueprints available. £950.—Speed Electrics, Dept. ET, Church St, Basford, Nottingham. (T 697)

SURPLUS stocks of the following new electrical equipment available at greatly reduced prices.

Contactors: 161 80 amp D.P. enclosed 210/50 volts; 20 80 amp T.P. enclosed 210/50 volts; five 200 amp T.P. enclosed 210/50 volts.

Fan Heaters: 30 3 kW 200/10 volts a.c.; one 230/50 volts d.c.; 28 5 kW 200/20 volts d.c.; 33 230/50 volts d.c.; two 10 kW 200/10 volts a.c.; three 15 kW 200/10 volts a.c.; one 250 volts a.c.

Radiant Heaters: 55 3 kW 200/20 volts a.c./d.c.

Offers or inquiries to Box No. 8175, Electrical Times. (T 600)

ELECTRICAL FAULT DIAGNOSIS

An indispensable book for Works Maintenance Engineers

A quick guide to trouble finding in all classes of industrial electrical equipment. By the use of tables specially classified according to defects in plant, a direct lead is given to the causes of trouble and the appropriate action required. The tables also act as a check list to ensure that no possible cause is overlooked.

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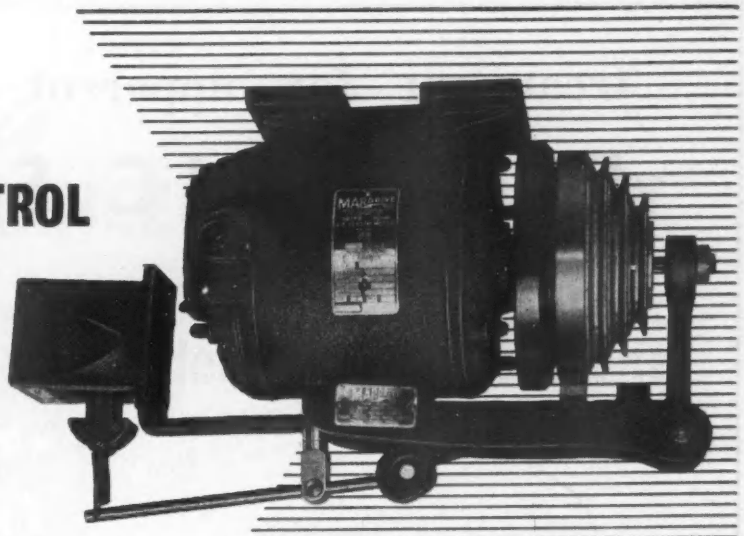

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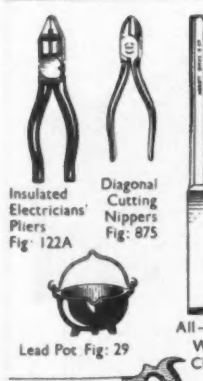
Insulated Electricians' Pliers Fig: 122A

Diagonal Cutting Nippers Fig: 875

All-steel Wood Chisels

Steel Tool Box Fig: 18

Leather lined Tool Bags Fig: 245

Pistol Grip Adjustable Hacksaw Frame Fig: 137

Linesman's Safety Belt Fig: 2013

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"Footprint" Wrenches Fig: 698

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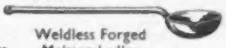
Tinsnips Fig: 650


Weldless Forged Melting Ladles Fig: 30

Linesman's Pole Climbers Fig: 2017

Carpenters Screw Augers Fig: 552

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Blow Lamp Petrol or Paraffin Fig: 149

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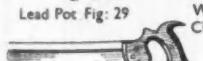
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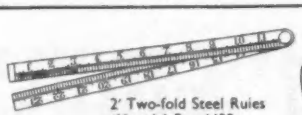
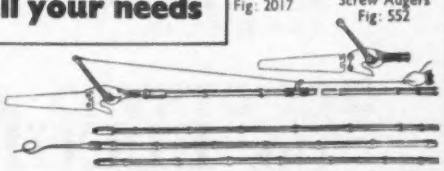

2' Two-fold Steel Rules (½" wide) Fig: 1638

Shave Hook Fig: 487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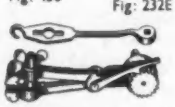
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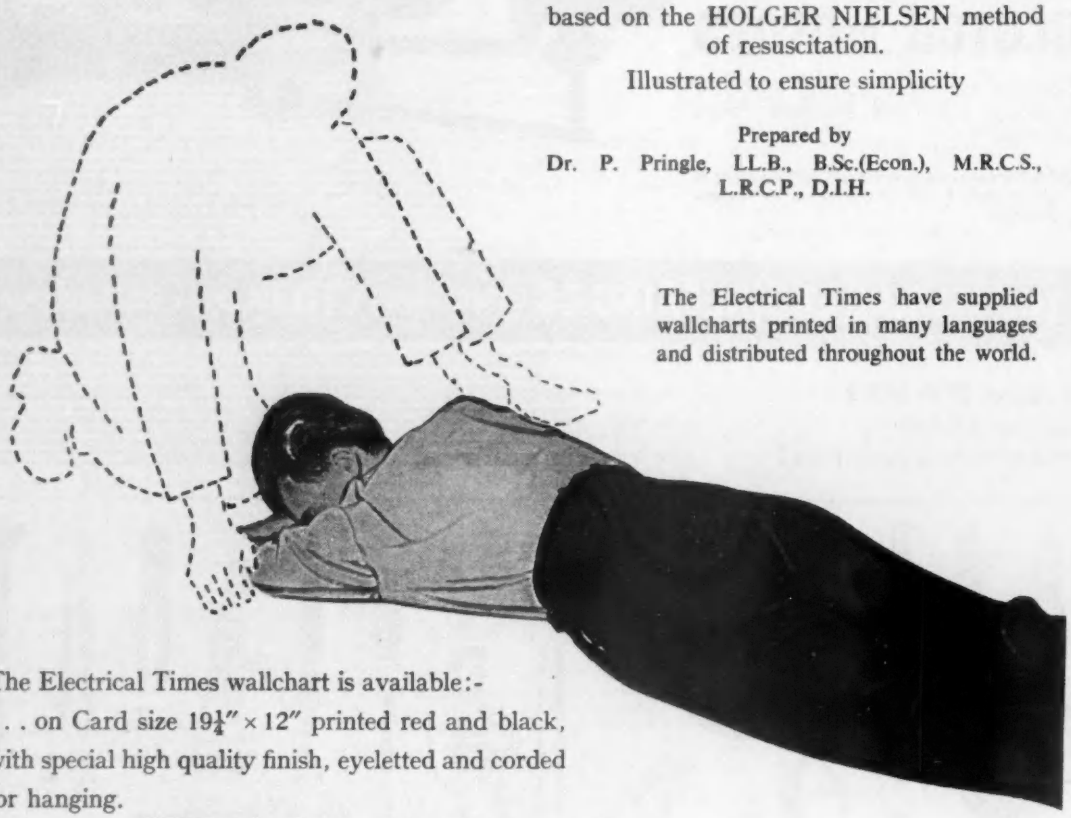

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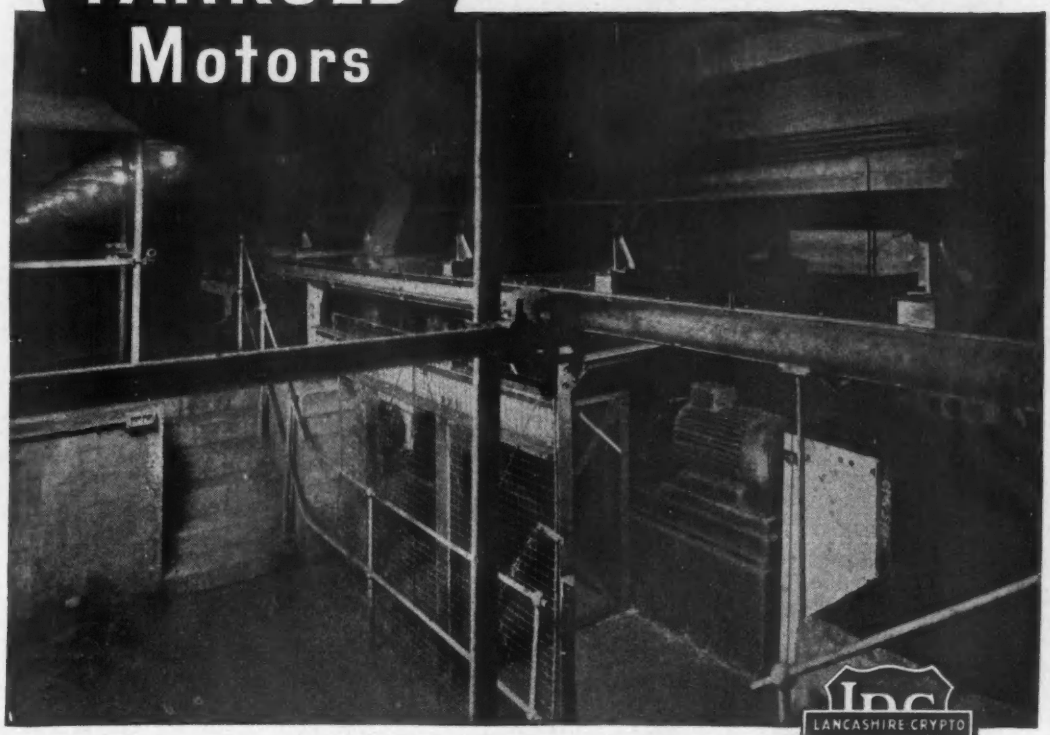

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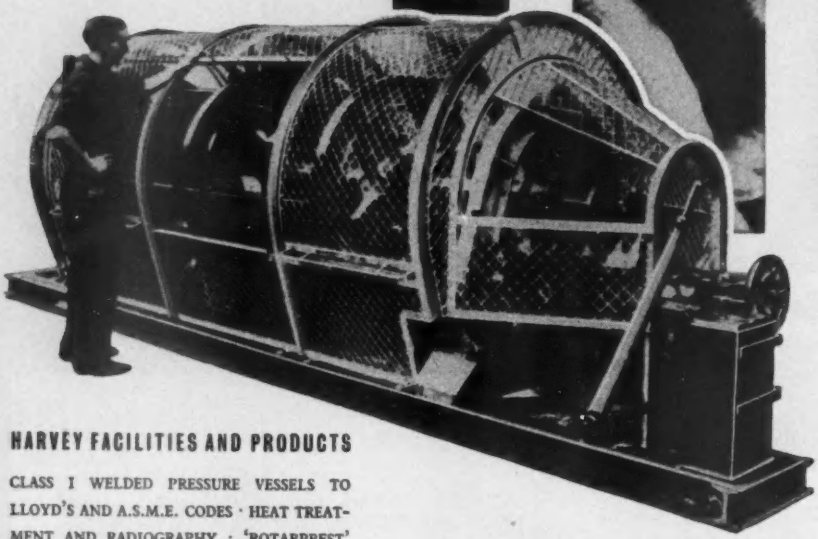

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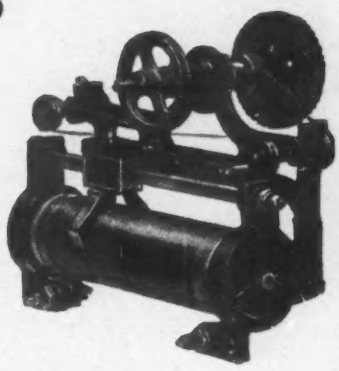

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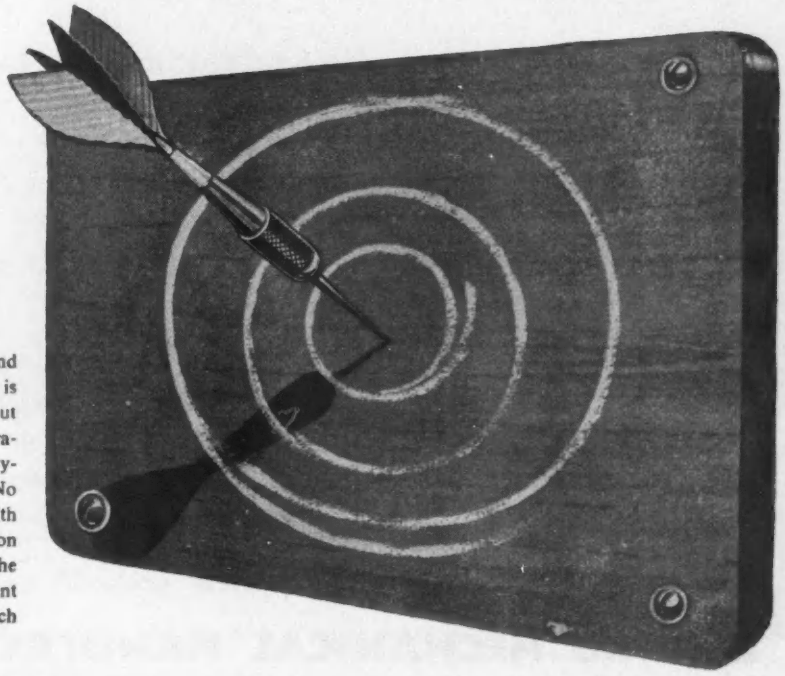

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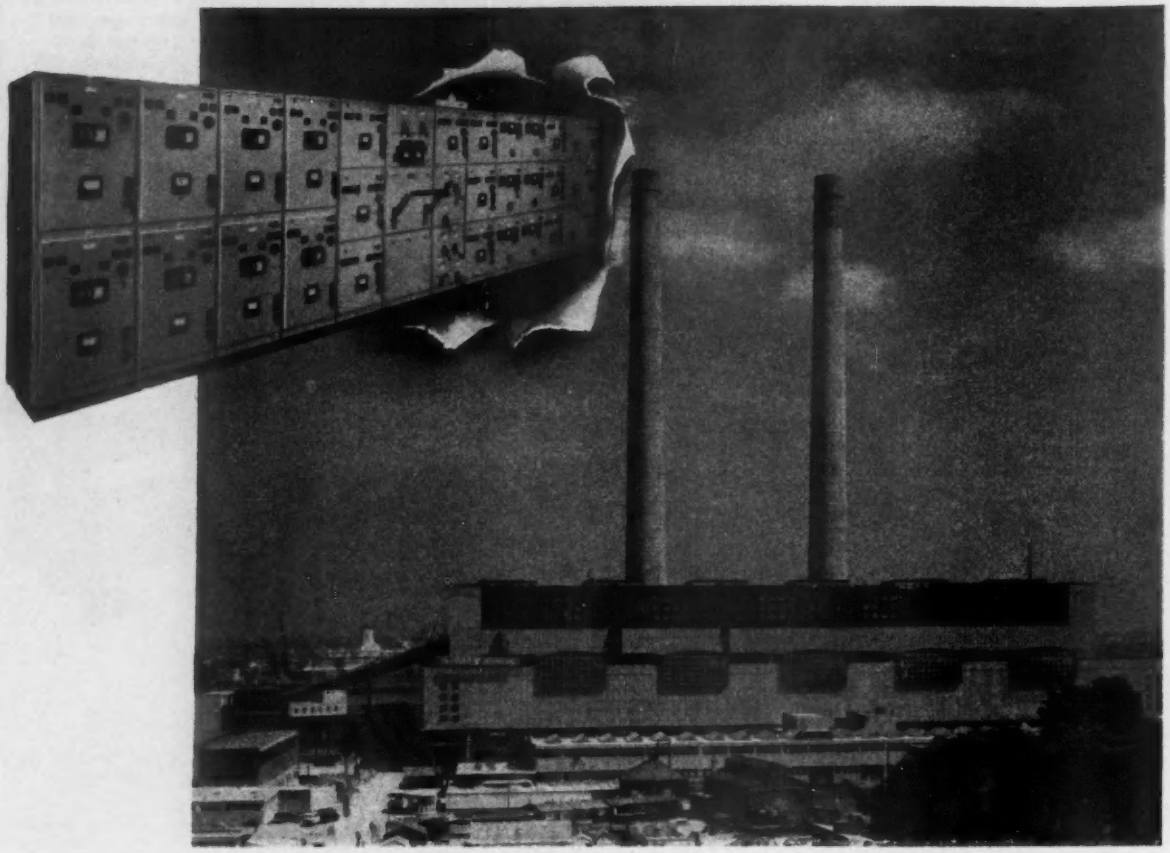

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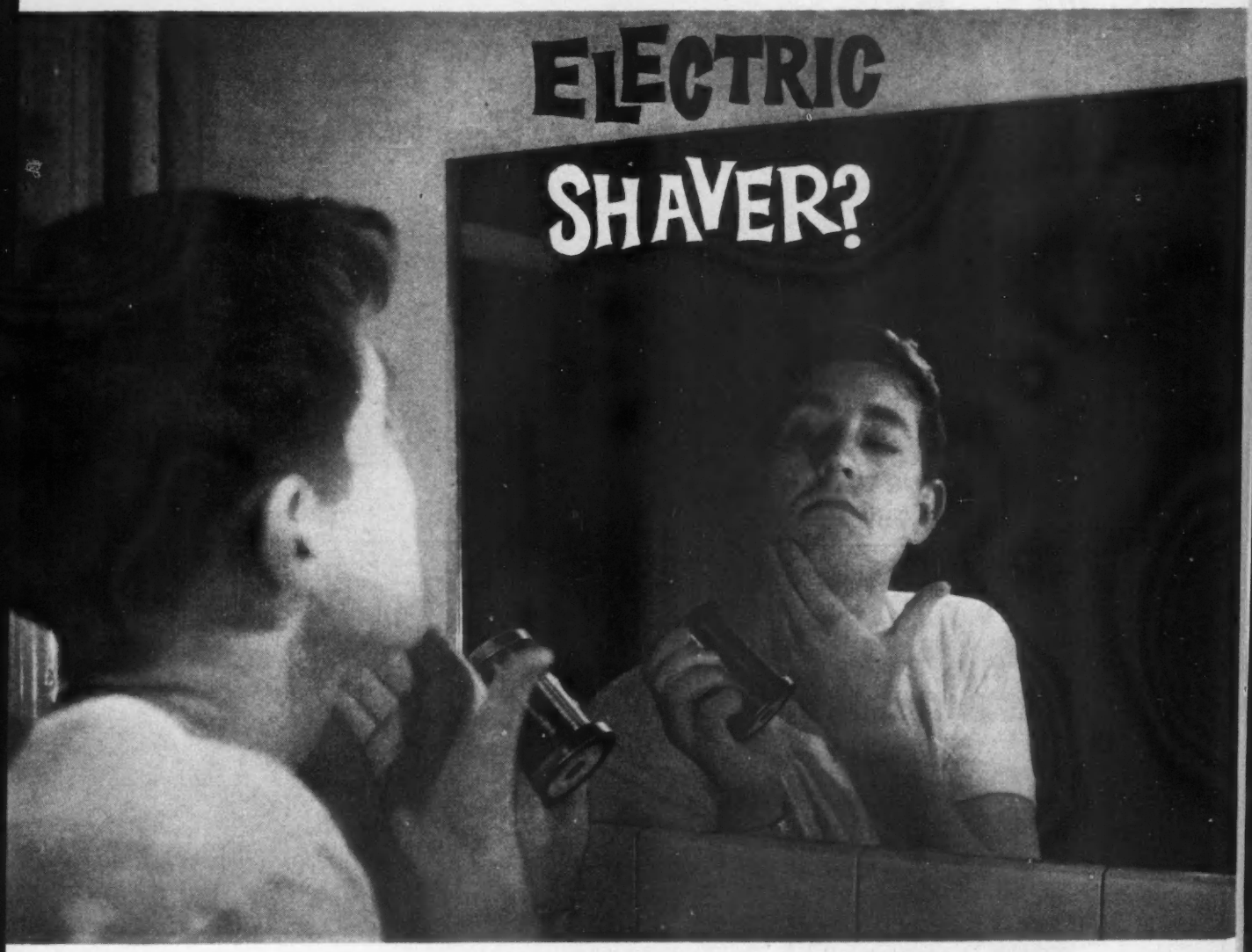

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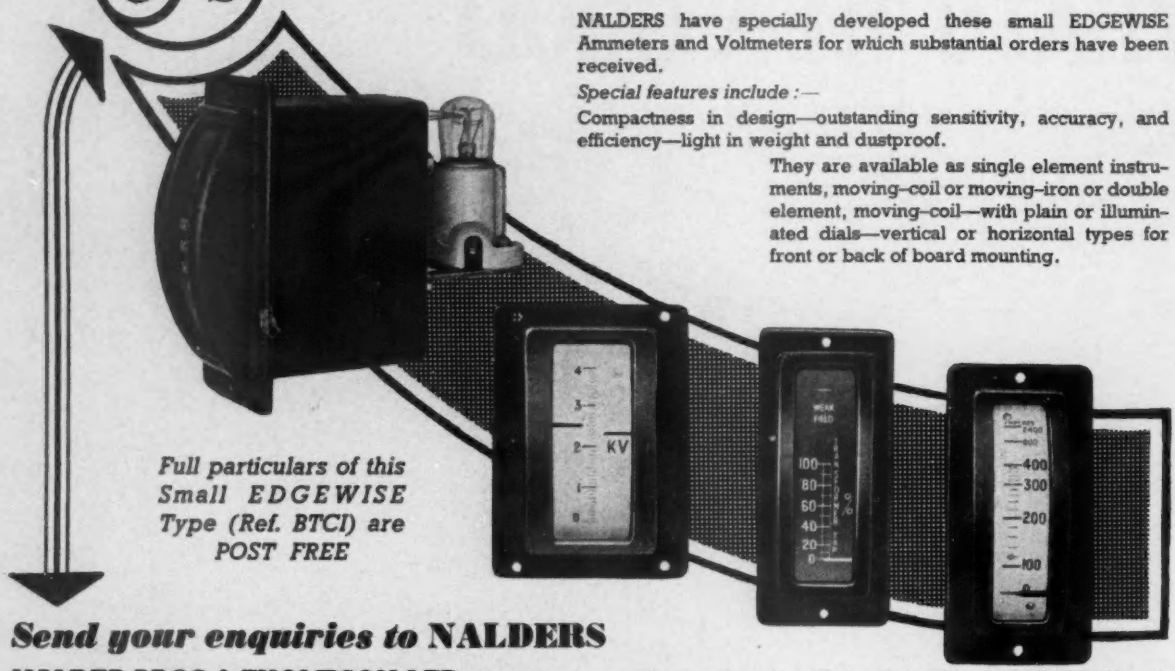

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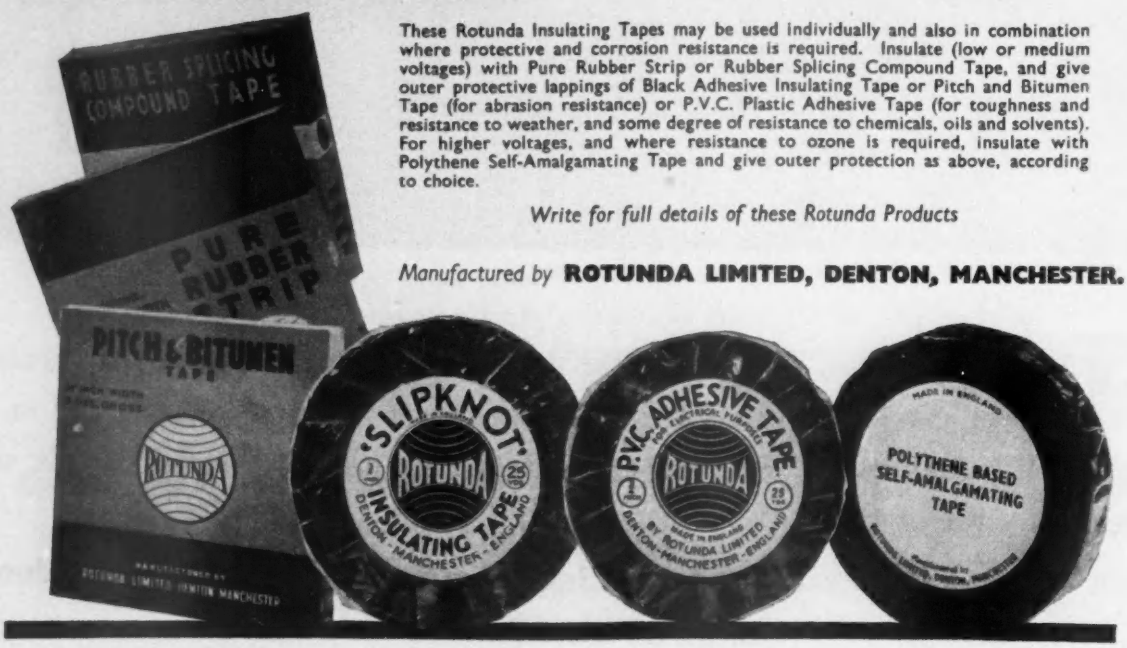

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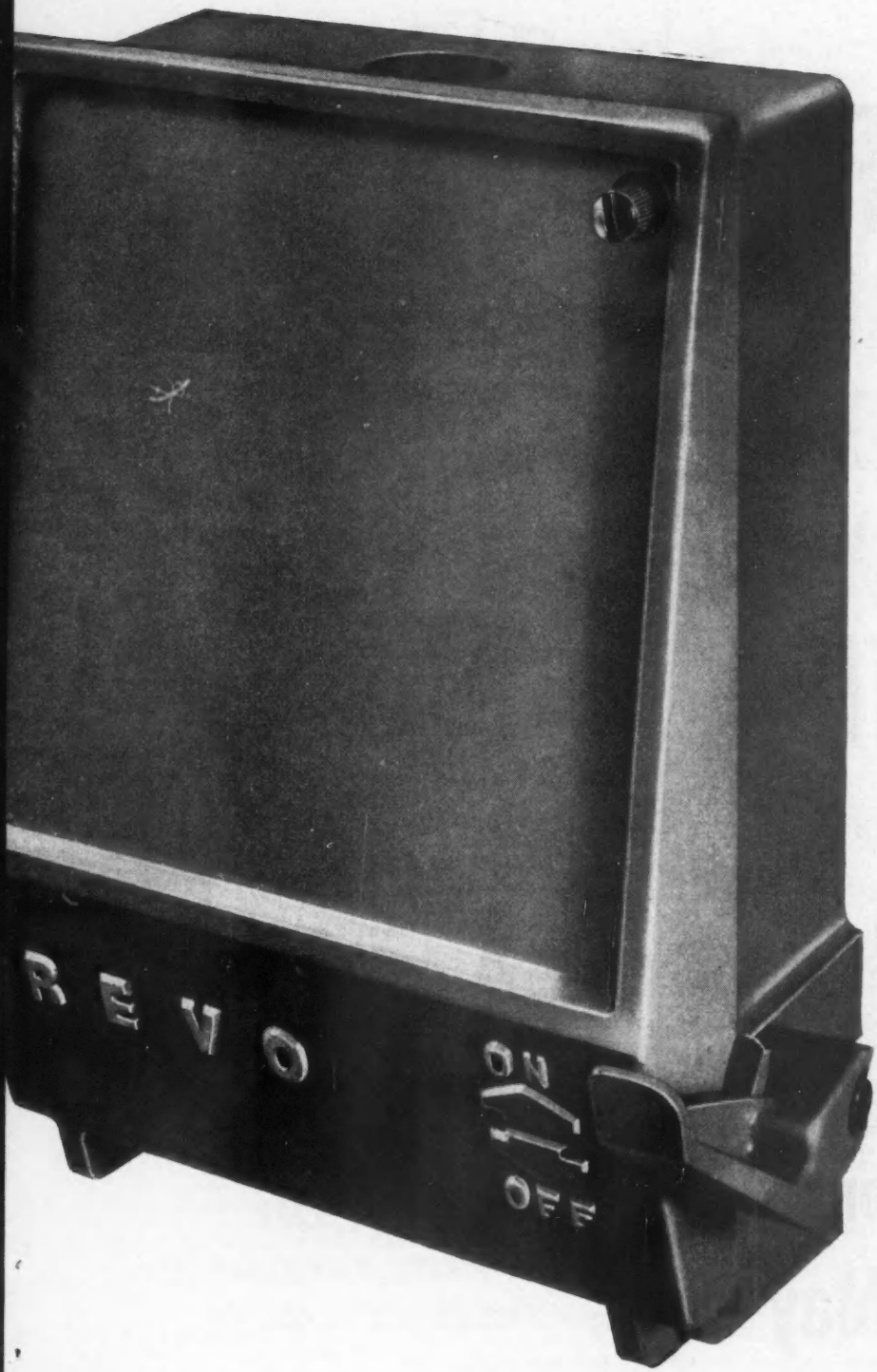

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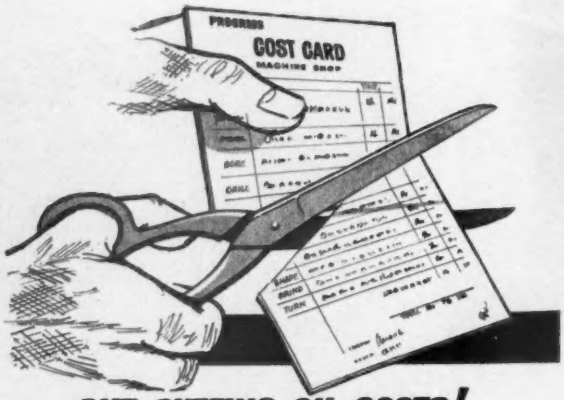

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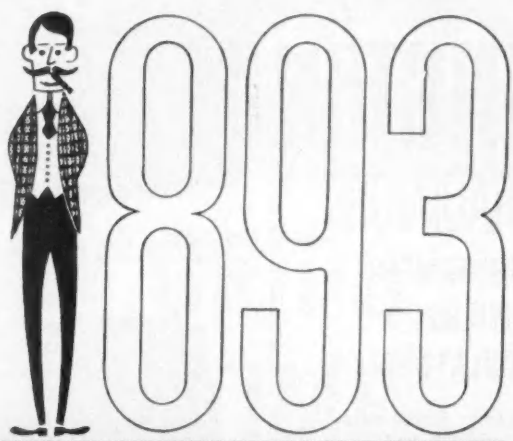

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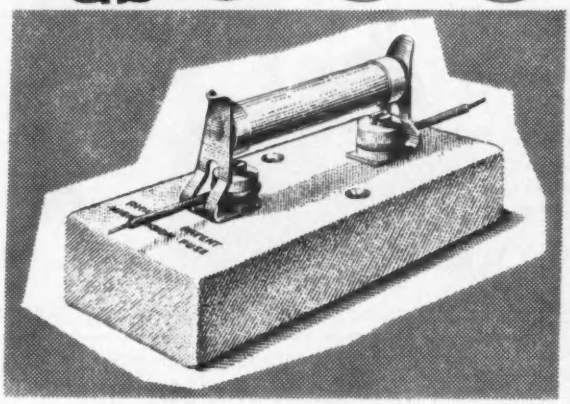

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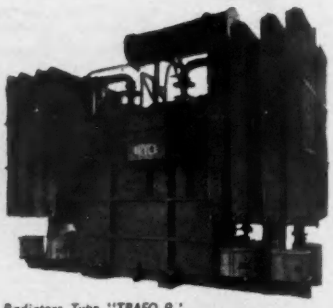

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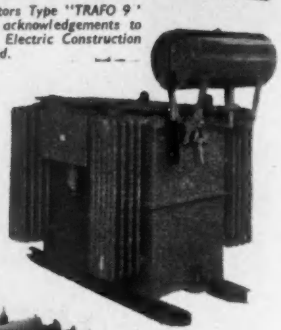

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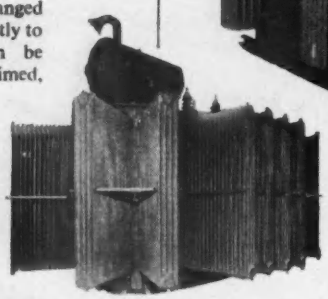

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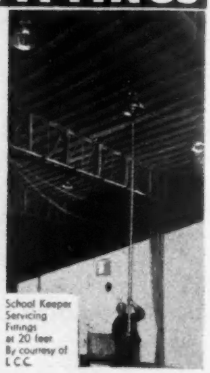

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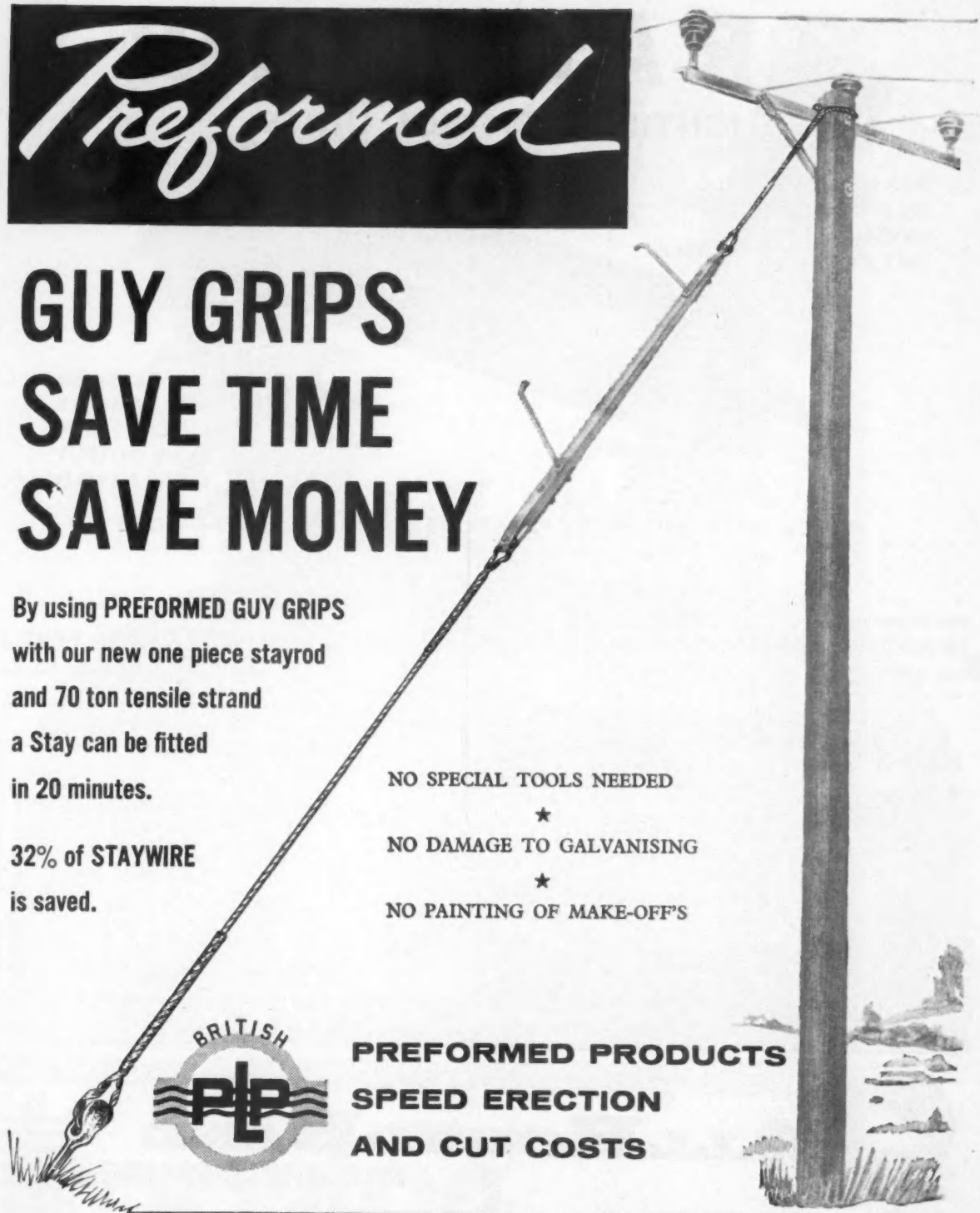

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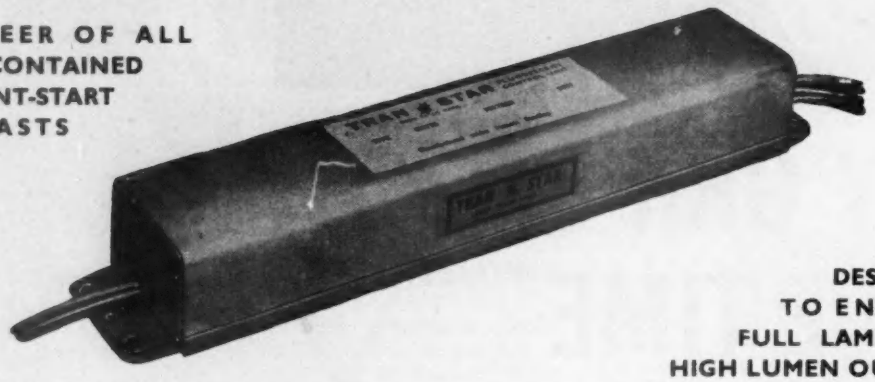

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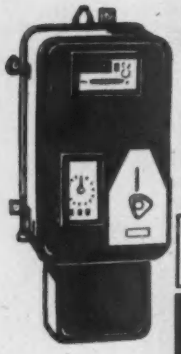

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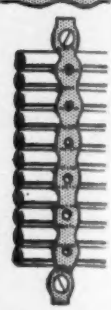

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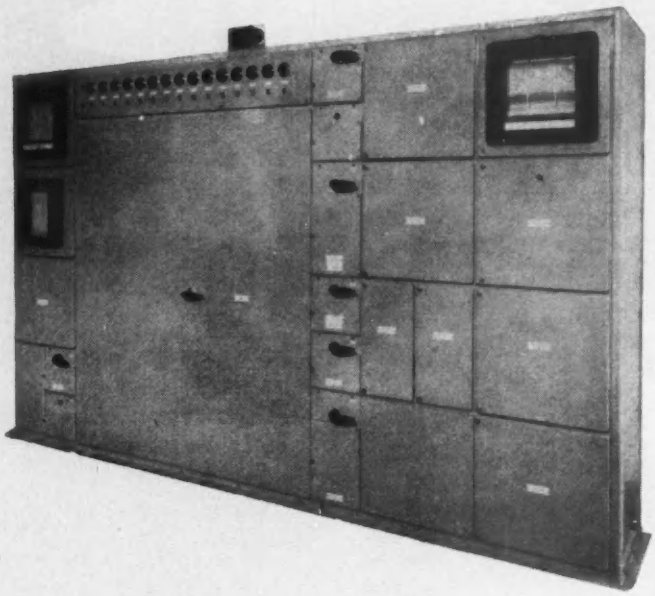

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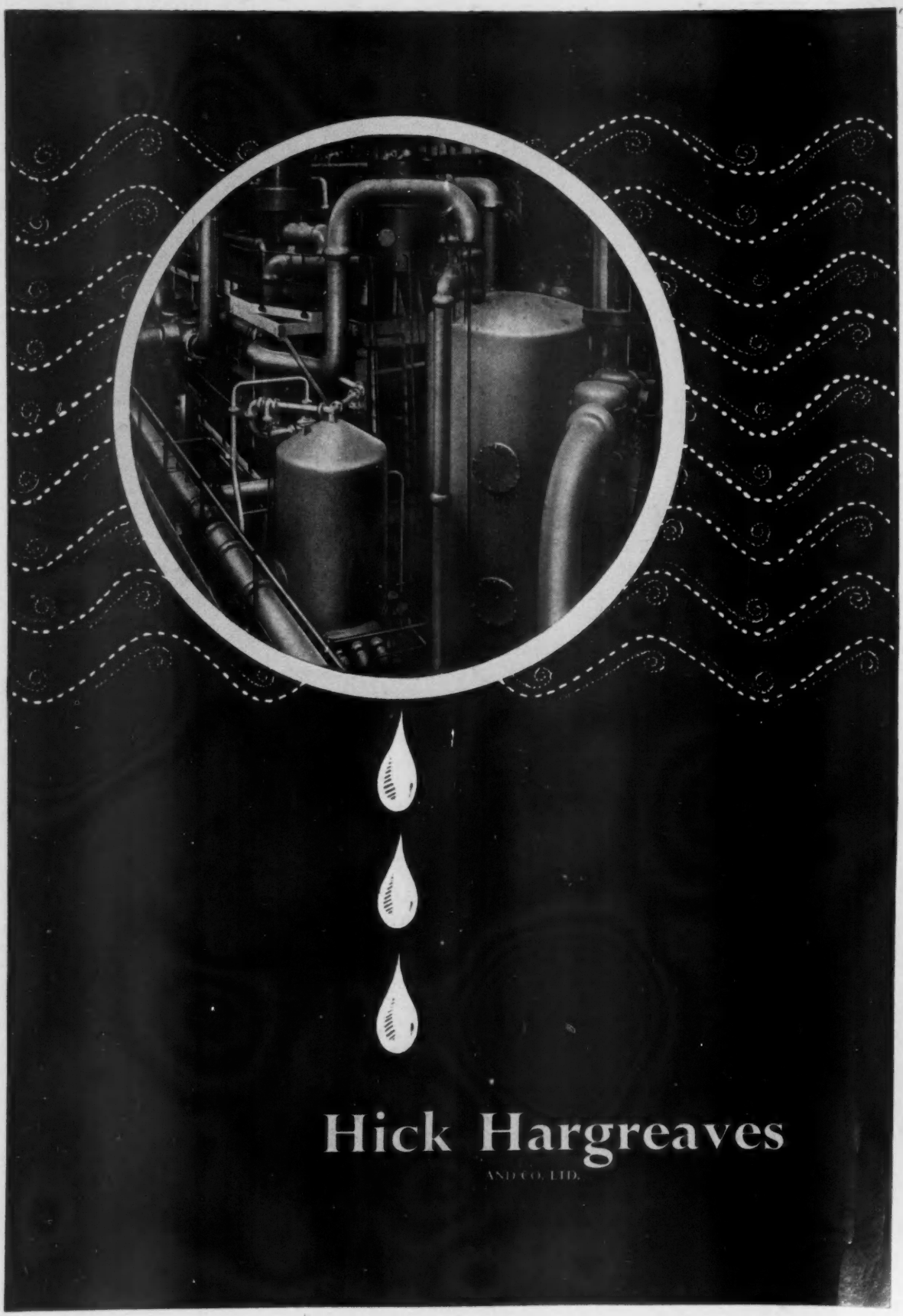
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